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ABSTRACT

The computer-based System of Interactive Guidance and Information (SIGI) was field tested and evaluated at five community colleges and one university. Developed by Educational Testing Service, SIGI assists students in the process of informed and rational career decision making. These appendices to the final evaluation report contain the manuals used in the operation of SIGI, and the instruments used in the evaluation. The Prediction System Manual explains how a college prepares the material used to adapt this subsystem to its curricula, student population, and grading practices. Appendix B, Occupational Information in SIGI, lists the occupations included, describes the information base, and the procedures for updating it. The Planning System Manual explains the procedures for gathering and organizing the local data used in SIGI's planning subsystem. Appendix D presents the questionnaires used in the evaluation; Appendices E and F give an explanation of the software and hardware used in SIGI. The Counselor's Handbook for SIGI was written to familiarize counselors with the theory behind SIGI, to describe the components of the system, and to anticipate problems that students may encounter in using it. (Author/BW)

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SYSTEM OF
INTERACTIVE
GUIDANCE
AND INFORMATION

ED146223

SIGI: FIELD TEST AND EVALUATION OF A COMPUTER-BASED SYSTEM OF INTERACTIVE GUIDANCE AND INFORMATION

VOLUME II: APPENDICES

Warren Chapman
Martin R. Katz
Lila Norris
Laura Pears

In collaboration with:

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Amy Weber

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MAY 1977

EDUCATIONAL TESTING SERVICE
PRINCETON, NEW JERSEY

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APPENDIX A

PREDICTION SYSTEM MANUAL

SIGI

System of Interactive Guidance and Information

PREDICTION SYSTEM MANUAL

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Introduction

The Prediction system for the System of Interactive Guidance and Information (SIGI) is designed to help students judge their chances of success in the various programs offered at a college. Students who use the Prediction system are given probability statements based on marks obtained by previous students. These probability statements show students their "chances in 100" of getting a given mark (e.g., A to B, C, or below C) in the "key course" for each program.

The concept of the "key course" is an essential element of the Prediction system. Ideally, a key course is defined as a course that comes early in a sequence of courses for a program, is required for that program, and covers some of the basic competencies required for that program. Most important, it should be a course that differentiates students who do well in the program from those who do poorly.

The Prediction system is different for every college because colleges differ in their curricula, student populations, and grading practices. This manual explains how a college goes about preparing the materials which adapt the Prediction system to its unique circumstances. Sample copies of forms and other materials referred to in the manual are included as exhibits which appear at the end of the manual.

Interactions in the Prediction System

When students enter the Prediction system, they are asked first for information about their high school performance. This includes estimates of high school rank and grades in English and mathematics. If the college has a mandatory admissions testing program, students also record their test scores.

Next, students select a program for which they want a prediction. The concept of "key course" is introduced and students are told the name of the key course for the program selected.

Students are then given information about the competencies that instructors who teach the course believe are required for getting good grades. Four such factors are identified for each key course. Students are asked to rate themselves on each of the factors. An example of one of these frames is shown in Exhibit 1.

Students are then shown a distribution of grades received by previous students in the course. An example of this frame is shown in Exhibit 2.

Following this, students are asked what grade they think they will get in the course. To help students estimate their grade, the frame gives a summary of all the information they have provided about themselves. An example of this frame is shown in Exhibit 3.

A prediction is then presented to students in the form of probability statements (i.e., chances in 100 of getting A to B, C, or below C). Students are told that their probability statements are based on high school performance, self-estimated grade, and test scores (if available). An example of this frame is shown in Exhibit 4.

Students can obtain predictions for as many programs as they wish. After each prediction, they have the opportunity to ask questions to help them understand their predictions. The questions they may ask are:

(1) What does "chances in 100" mean?
(2) What are my chances of passing this course?
(3) How can I predict what grade I will get in this course?
(4) How can I tell whether my chances are good or bad?
(5) SIGI and I disagree about the predictions. Is SIGI right or am I right?

Developing a Prediction System

The development of a college's Prediction system involves, first of all, identifying "key courses," and, secondly, collecting predictive data.

A brief explanation of these two stages of development follows. A more detailed explanation of procedures for developing a Prediction system begins on page 5.

Identifying Key Courses. The key courses identified by a college are the foundation for its Prediction system. It is impossible to spell out uniform rules for identifying key courses. Examples from two colleges, however, should provide some guidelines.

College A -- This college has a well-defined set of required courses for each program; there is little overlap in courses taken by students in different programs. In most instances, the counseling staff, with the help of department chairmen, was able to identify a first-semester course that qualified as a key course. Here are some examples:

Program	Key Course
Accounting	Accounting I (AC 101)
Business Administration	Business Org. & Mgmt. (BA 101)
Communications Media	Intro. to Comm. Media (CM 101)
Engineering Science	Math Analysis (MA 111)
Mathematics	Math Analysis (MA 111)
Nursing	Nursing (NS 101)
Social Sciences	Western Civilization (HIS 101)

Note that Math Analysis was identified as a key course for both the Mathematics and Engineering Science programs. This is appropriate because Math Analysis at this college (a) is a first-year course required of all students in both programs, (b) is representative of the kind of work required in both programs, and (c) has a reputation for separating the sheep from the goats.

The Social Sciences program presented a problem in that it has few required courses. "History" is required, but no particular history course is specified. The problem was resolved by selecting for the key course the history course that is taken by most students. Some students enrolled in the Social Sciences program may not take the key course. The predictive information presented to them is still useful, however, because their predicted performance in one history course is highly related to their predicted performance in the others.

College B -- Unlike College A, this college has a loosely structured set of programs. Furthermore, the majority of students come to the college in need of some remediation. Much of the course work during the first year is designed to bring students up to college level work and to motivate them to continue on in college.

That being the case, it did not make sense at this college to select first-year courses as key courses. Instead, key courses are typically second-year courses. Some examples are:

Program	Key Course
Accounting	Principles of Accounting (BA 211)
Nursing	Human Anatomy (BY 251)
Mathematics	Calculus and Analytical Geometry (MA 290)

Here are some of the steps which a college's counseling staff, in conjunction with department chairmen, usually follows in identifying key courses:

1. List all programs, terminal and transfer, offered at the college.
2. Identify one or two courses for each program that meet as many as possible of the following specifications:
   - (a) required course
   - (b) early course in a sequence
   - (c) differentiates those who do well in program from those who do poorly
   - (d) course work highly relevant to program
   - (e) course work representative of the entire program
3. Delete from the list any courses that have not been taught before or that have undergone a change which is likely to have a significant effect on grades (e.g., a drastic change in content, instructors, or grading practices). If possible, eliminate any remaining courses that usually have an enrollment of less than 80 students. (Since we have found that as many as one-third to one-half of the students initially enrolled in a course withdraw during the term, it is necessary to start with at least 80 students to get the minimum of 50 students completing a course. Prediction equations based on fewer students are likely to be highly unstable.) If a satisfactory substitute cannot be found for a course with a small enrollment, leave it on the list. You will then have to collect data for that course at the beginning of several semesters until the sample becomes large enough for the calculation of prediction equations.
4. Go over the courses remaining on the list and select one course for each program. As stated previously, a course may occasionally be appropriate for more than one program. At present, the system can accommodate a maximum of 75 key courses.

Collecting Predictive Data. For predictions to be computed, studies must be done at the college to relate test scores and other variables to grades. With the assistance of the SIGI staff at ETS, the college provides the necessary data for such studies to be carried out.

For each key course, the college provides information about the kinds of competencies that instructors believe contribute to getting good grades. This information is incorporated into a questionnaire on which students estimate their own performance in a course. The questionnaire is administered to students by course instructors on the first day of classes.

At the end of the term, the college records final grades for all students who completed a questionnaire. If the college has a mandatory admissions testing program, test scores are also recorded for students.

The data are returned to ETS to be analyzed. The prediction equations resulting from this analysis are stored in the computer and provide the basis of the college's Prediction system.

Procedure for Developing a Prediction System

Step 1.

Complete both Form A (Exhibit 5), which is a listing of programs, key courses, and labels, and Page 1 Request Sheet (Exhibit 6), which is an estimate of the number of students enrolled in each key course. Both forms should be completed and returned as quickly as possible (See Time Table, p. 10). Lead time is needed by ETS to review Form A and print appropriate numbers of materials.

Return Form A and Page 1 Request Sheet to ETS.

Step 2.

Fill in the name of each key course on the front of a Form B: Identifying Important Grade Factors (Exhibit 7). Have someone from the appropriate department (course instructor or department head) complete each Form B following the instructions included with the form (Directions for Completing Form B, Exhibit 8).

Check to see that you have a completed Form B for each key course listed on Form A. If you return an incomplete set of Form B's (for example, if instructors are not available for one or two courses), please indicate in an accompanying letter when we can expect the remaining forms.

Return Form B's to ETS for review.

Step 3.

For each key course, complete a Form C: Distribution of Grades (Exhibit 9). Note that distributions should be completed for key courses in which data are available for at least 50 students who complete the course, excluding withdraws and incompletes. Prepare a brief description of the grading system used at the college to be returned with your Form C's.

Return Form C's and description of grading system to ETS for review.

Step 4.

For each key course, develop a Student Questionnaire (Exhibits 10 and 11).

The Student Questionnaire is designed to give students information about a key course that will help them estimate their performance in that course. Pages 1 and 4 will be the same for all questionnaires. Pages 2 and 3 of the questionnaire contain information specific to a key course. These pages must be specially prepared for each of the key courses at the college.

Exhibit 10 is a completed Student Questionnaire which shows, on pages 2 and 3, how one college supplied information for a key course, "Introduction to Business." Exhibit 11 is a blank Student Questionnaire.

The following adaptations to the blank questionnaire must be made by the college **(See Exhibit 10)**:

(1) Page 2 (yellow)--For each key course, make up a page similar to the one shown in the sample copy, substituting the appropriate distribution of marks. The distributions should agree with those provided on Form C. If a course has a large percentage of incompletes or withdraws, describe the nature of the grade and the kinds of students who are getting this grade by adding a footnote to the information on page 2 (as shown in the sample copy).

(2) Page 3 (pink)--Make a separate page 3 for each key course. Grade Factor 1 will always be the same. Under Grade Factor 2, INTEREST IN SUBJECT AREA, insert the course description from the key course's Form B. Add Grade Factors 3 and 4 which were identified on Form B. (In reviewing Form B, changes in wording may be made by ETS. The material included on page 3 should be identical with that which appears on Form B after it has been reviewed by ETS and returned to the college.)

(3) Page 5 (white)--As a reference for item #13 on the questionnaire, make up a list of programs offered at the college. Assign a three-digit number to each program, beginning with 101. Include the list as page 5 of the Student Questionnaire.

Step 5.

After all forms have been reviewed by ETS and returned to the college, final copies of the Student Questionnaire should be prepared for printing. The college will be responsible for printing sufficient numbers of pages 2-5 of the Student Questionnaire to administer to students enrolled in each of the key courses. ETS will provide sufficient copies of page 1 based on each college's Page 1 Request Sheet.

Send a copy of each 5-page Student Questionnaire (one for each key course) to ETS for our files.

Step 6.

Arrange to have Student Questionnaires administered to students. Inform instructors well in advance that the administration should take place on the first day of classes. Before giving out the questionnaire, fill in the place of return on the front of the Return of Answer Sheets envelope.

In view of the large numbers of students enrolled in some key courses, a limit of 200 has been set as the number of students to be tested. This will require comprehensive sampling. The main guideline to follow in selecting sections to be tested is that the sample should be a good representation of all students in the course and all instructors teaching the course. For example, if about 40% of the students normally taking a key course have a learning disability, the sample should reflect this. This practice holds true for sex, age, ethnic groups, and other things that might make a difference. If less than 200 students are enrolled in a key course, administer the questionnaire to all students.

Instructors teaching key courses should be given the following materials:

(a) A sufficient number of the appropriate questionnaire for all students in the class.

(b) A copy of Directions for Administering the Student Questionnaire (Exhibit 12). Copies for each instructor will be provided by ETS, but the college may want to add to or change the directions to meet specific conditions at the college.

(c) A Return of Answer Sheets envelope, with appropriate return address within the college entered on the front.

Step 7.

Have the first page of each Student Questionnaire (the Answer Sheet) scanned for completeness. Things to scan for:

(a) Missing information (e.g., make sure that the name of the course is written under Section 2).

(b) Double answers (e.g., for questions 5, 6, and 7 students sometimes indicate more than one response):

______ A+, A, A-
__✓__ B+, B, B-
__✓__ C+, C, C-
______ D or below

This is not acceptable.

(c) Inappropriate responses (e.g., for item #4, students sometimes write "as many as needed" instead of a number. This is also common in Section 3, where the number of hours of study per week is asked.)

Return any incomplete Answer Sheets to students and have them fill in the missing data. (Provide them with pages 2-5 of the questionnaire if necessary. Instructors will have returned unused questionnaires with the completed Answer Sheets.)

Step 8.

This step applies only to those colleges that have a mandatory admissions testing program.

Fill in each student's test score(s) under Section 5: TEST SCORES, on the Answer Sheet. If a student does not have a score for any test, put a dash in the space for that score. (See page 1 of completed sample of Student Questionnaire, Exhibit 10.) Put the names and order of the tests on a single sheet of paper and send it to ETS with the package of Answer Sheets. (See Exhibit 13.)

If test scores are stored on disk or tape and consequently are available from the computer center, there is an alternate procedure to Step 8. This procedure, which is described in Alternate Steps 8 and 9, makes it unnecessary to hand record the test scores onto the Answer Sheets.

Step 9.

A final grade must be recorded for every student who completed a Student Questionnaire. If grades are available from the computer center, skip Step 9 and go on to Alternate Steps 8 and 9.

If grades are not available directly from the computer, enter a final grade under Section 6: FINAL GRADE on the Answer Sheet.

In recording grades, use the following code:

A = 4
B = 3
C = 2
D = 1
F = 0
Withdraw = 5
Incomplete = 6

If your college uses a grading system other than A through F or 4 through 0, please contact ETS for further directions.

NOTE: Some schools do not give failing grades and allow students to withdraw instead. This can cause difficulties in developing prediction equations. If the withdraw (W) grade is reserved for students who are having trouble coping with the course work, there is no problem; W's can be treated as failures. However, if the W grade is used for a variety of situations, we must determine whether the cause for withdrawal is academic (having difficulty with the work) or non-academic. Failure to do so could cause a serious bias in the predictions given to students.

If your school is one of those that do not give failing grades, follow this procedure: Use the grade "0" to indicate withdrawal for academic reasons (i.e., having trouble with the course work). Use the grade "5" for students who withdraw for unknown or non-academic reasons.

Alternate Steps 8 and 9.

The procedures described below are to be followed when grades and test scores (if used) are available from the computer center.

(a) Check with the computer center to determine what student and course identification is required to get students' grades in a key course (and test scores) from the computer. For example, some college computer centers require social security numbers while others need college I.D. numbers. Some computer centers also require a special course code number to identify key course grades.

(b) After the Answer Sheets have been scanned (Step 7), return them to ETS. Include a completed Record of Student Answer Sheets form (Exhibit 14). **If you have not already sent a copy of each of the 5-page Student Questionnaires you administered, include these now. Also, provide an exact description of the information needed by the computer center to retrieve students' grades and test scores. If test scores are to be collected, include the names and order of the tests as shown in Exhibit 13.**

(c) About 2-4 weeks after the Answer Sheets have been sent to ETS, you will receive an IBM card deck and a card layout form. Each card in the deck will correspond to an Answer Sheet. The cards will contain information from the Answer Sheets as well as the information needed by your computer center to retrieve grades and test scores. The card layout form will provide a description of what is already on the card and where the grades (and test scores) are to be punched.

At the end of the semester, as soon as grades can be retrieved from the computer, have the computer center punch the grade (and test scores) onto the card deck exactly as shown on the card layout. Even the slightest deviation from the directions on the card layout will result in wrong predictions being developed.

Return the completed card deck to ETS.

Return of Data

All forms should be returned to ETS as soon as possible. (See chart, p. 10.) Return envelopes are provided. Deadlines for the return of forms for a September administration are:

Form	Deadline
Form A and Page 1 Request Sheet	June 30
Form B's Form C's	July 31
Answer Sheets for Student Questionnaire (or completed card deck)	Two weeks after the end of the fall term

Summary of Activities and Sample Time Table for September Administration

Activity	Deadline
1. Complete Form A. Send to ETS.	June 30
2. Complete Page 1 Request Sheet. Send to ETS.	
3. Complete one Form B for each key course and send them to ETS.	July 31
4. Complete one Form C for each key course and a description of grading system. Send to ETS.	
5. Develop Student Questionnaire, including Programs List (p. 5), for each key course.	August 15
6. Print Student Questionnaires.	Two weeks prior to beginning of fall term
7. Sort questionnaires into packets, alert instructors, and distribute packets.	
8. Administer Student Questionnaires.	First day of classes, fall term
9. Scan Answer Sheets for completeness.	Immediately upon receipt
If grades (and test scores) are to be recorded by the computer:	
If grades (and test scores) are to be recorded by hand:	
10. Enter test scores on Answer Sheets.	During fall term
11. Enter final grades on Answer Sheets.	End of fall term
12. Return completed Answer Sheets to ETS with cover page identifying test scores. Include Record of Student Answer Sheets form.	Two weeks after end of fall term
10a. Return Answer Sheets and Record of Student Answer Sheets form to ETS with cover letter identifying test scores. Include a description of the information required by the computer center.	Two weeks after Administration of Student Questionnaires
11a. Take IBM card deck sent to you from ETS to computer center to have grades (and test scores) entered.	End of fall term
12a. Return the completed card deck to ETS.	Two weeks after end of fall term

Time Schedule Considerations

Problems which can delay the start of the SIGI Prediction system are set forth below. A consideration of these difficulties may better enable the college to estimate and adhere to a time schedule.

1. Completing Form A. Completion of Form A precedes all other work on the Prediction system. The identification of appropriate key courses is a very important part of the system and may involve several iterations. Therefore, it is imperative that the college begin this work as soon as possible. We at ETS are ready to assist the college in solving any problems which may develop. In addition, we will review the list of programs and key courses which are identified. Sufficient time should be scheduled by the college for ETS to review Form A.

2. Completing Form B. Completion of Form B requires that someone from each department provide information for a given key course. After being reviewed by the SIGI coordinator at the college and by the SIGI staff at ETS, this information will be used to develop material for page 3 of the Student Questionnaire. Any delay in receiving completed Form B's from the various departments will delay preparation of the Student Questionnaire. Therefore, the importance of each department's cooperation should be stressed, and a deadline for the receipt of completed Form B's should be established.

3. Listing of Programs. The Programs List, page 5 of the Student Questionnaire, is the responsibility of the college. Item #13 on page 1 of the questionnaire cannot be answered without this list. Make sure that it is accurate and contains all the degree and transfer programs offered at the college. Be specific. The list should be printed with the other pages of the Student Questionnaire and attached as page 5.

4. Printing Arrangements. Contact the printer in advance about the specifications of your order. Be sure that the printer can have the materials ready by the required date. Leave some overlap time in case an error is made in preparing the materials.

5. Collating Arrangements. After they are printed, pages 2, 3, 4, and 5 of the Student Questionnaire must be collated with page 1. All five pages must then be stapled together. If you have the printer collate the materials for you, be sure to provide him with the page 1's. If you have this job done by workers at the college, keep in mind that collating by hand is very time-consuming and be sure to allow sufficient time for it. Whether the questionnaires are collated by the printer or by hand, a check should be made to ensure that pages 2 and 3 refer to the same key course.

6. Distribution Arrangements. Once the questionnaires have been collated and stapled, allow time for them to be sorted into quantities for each class. Label the Return of Answer Sheets envelope with the appropriate return address. Provide a copy of the Directions for Administering the Student Questionnaire for each instructor. Alert the instructors to the questionnaire, and stress the importance of their cooperation. Instructors should receive all materials in time to administer the questionnaire on the first day of class.

7. Receiving Completed Student Questionnaires. Keep track of the questionnaires. Contact any instructors who have failed to return them. Scan the questionnaires for completeness. Make sure each questionnaire contains the student's name and name of the key course. This check should be done immediately so that students may correct any problems as soon after the start of class as possible.

8. Test Scores. Enter test scores as soon as possible to avoid a backlog of work when the final grades arrive. Use a dash for each missing score. To avoid having to label hundreds of test scores, identify the scores (type of test, subject area) on a cover sheet. (See sample cover sheet, Exhibit 13.)

For Further Information

Direct all questions concerning the Prediction system to Lila Norris at:

Educational Testing Service
Princeton, NJ 08540
Telephone: 609-921-9000, ext. 2316

Exhibit 1

Prediction Frame Showing Grade Factors

Bus. Admin.: BA 101 Intro to Business

GRADE FACTORS:	(1) Top 1/5	(2) 2nd 1/5	(3) Remaining 3/5ths
Interest in subject area	--	--	--
Commitment to program	--	--	--
Third Factor	--	--	--
Fourth Factor	--	--	--

Instructors of this course say that a student's INTEREST IN THE SUBJECT AREA is an important factor in grades. Here is a description of this course:

You hear lectures on finance, marketing, communication skills, personnel administration, production, and economics. You participate in class discussions on assigned readings in textbooks, newspapers, and business periodicals. You write 3 or 4 short papers.

Compared with other students, in which column--(1), (2), or (3)--would you place yourself? Press the number (1-3) to show the column.

Exhibit 2

Prediction Frame Showing Grade Distribution

Bus. Admin.: BA 101 Intro to Business

Now look at what happened to previous students in this course. The chart shows how their grades were distributed:

NOTE THAT: More than one-third of the students (35%) got an A;
more than three-quarters of the students (80%) got C OR BETTER;
only 10% of the students got below C-;
and 10% of the students never completed the course.

PERCENT OF PREVIOUS STUDENTS RECEIVING VARIOUS GRADES:

	Grade	Percent of students receiving grade
GROUP (1)	A+, A, A-	*********************************** (35%)
GROUP (2)	B+, B, B-	*************************** (27%)
GROUP (3)	C+, C, C-	****************** (18%)
GROUP (4)	Below C-	********** (10%)
	Incompl.	********** (10%)

Exhibit 3

Prediction Frame Showing Summary of Information About Student

```
                    Bus. Admin.:  BA 101 Intro to Business

PAST PERFORMANCE:  Class rank:  3rd  fifth              English grade:  C
                   Math grade:  B             English native language:  Yes


GRADE FACTORS:                               Top 1/5     2nd 1/5    Remaining 3/5
                Interest in subject area      ___          _X_          ___
                   Commitment to program      ___          _X_          ___
                            Third Factor      ___          ___          _X_
                           Fourth Factor      _X_          ___          ___

PERCENT OF PREVIOUS STUDENTS RECEIVING VARIOUS GRADES:
                Grade      Percent of students receiving grade
  GROUP (1)  A+, A, A-   *********************************** (35%)
  GROUP (2)  B+, B, B-   *************************** (27%)
  GROUP (3)  C+, C, C-   ****************** (18%)
  GROUP (4)  Below C-    ********** (10%)
             Incompl.    ********** (10%)

Which GROUP (1-4) do you think your grade will be in?  Press that number.
```

Exhibit 4

Prediction Frame Showing Probability Statements

Program:	Key course	Chances in 100 for a grade of: A to B	C	Below C
Bus. Admin.:	BA 101 Intro to Business	45	35	20

The chart shows what your CHANCES are of getting a particular grade.

You have 45 chances in 100 of getting a B or higher (A or B). You have 20 chances of not getting a grade as high as C.

Now think carefully. According to the chart, what are your chances of getting C or better? Not just C, but a C or higher?

Type in your answer as a number between 1 and 99. If you make a mistake, press RUBOUT and start over. When you are finished, press NEXT.

Exhibit 5

FORM

A

LISTING OF PROGRAMS, KEY COURSES, AND LABELS

SIGI

System of Interactive Guidance and Information

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Exhibit 5 (continued)

DIRECTIONS

1. In the column marked PROGRAM, list all the transfer and non-transfer degree programs offered at your college. (Use back page if needed.)

   Examples: Drafting and Design Technology; Electronics Technology; Humanities and Social Sciences; Mathematics; Biology.

2. Next to each program, in the column marked KEY COURSE, write the key course for that program. Refer to the section on key courses in the instructions in the SIGI Prediction System Manual.

   Here are some general steps to follow in identifying key courses.
   A. Identify one or two courses for each program offered at the college that meet as many as possible of the following characteristics:
      (a) Required course.
      (b) Early course in a sequence.
      (c) Differentiates those who do well from those who do poorly.
      (d) Coursework is highly relevant to program.
      (e) Coursework is representative of the entire program.

   B. Delete any courses that have not been taught before or that have undergone a drastic change likely to have a significant effect on grades--e.g., a change in content, instructors, or marking practices. If possible, eliminate courses with fewer than 80 students. (See Prediction Manual, p. 2, #3.) If a satisfactory substitute cannot be found for a course with small enrollment, include it on the list. Data will be pooled across terms to reach the required number of students.

   C. Go over the list and select one course for each program. A course may occasionally be appropriate for more than one program. At present the system can accommodate a maximum of 75 key courses.

   Examples of Programs and Key Courses:

Program	Key Course
Accounting	Accounting I (AC 101)
Business Administration	Business Org. & Mgmt. (BA 101)
Communications Media	Intro. to Communic. Media (CM 101)
Engineering Science	Math Analysis (MA 111)
Mathematics	Math Analysis (MA 111)

3. Next to each program and key course listed, in the column marked LABEL, write in a label naming the program and key course. The label is not to exceed 45 characters. (Each letter, number, punctuation mark, and space between words counts as one character.)

   Examples: Electronics Tech.: MA 110, Technical Math (41 characters)
   Accounting: AC 101, Accounting I (32 characters)

4. The maximum number of program names that can be displayed at one time on the screen is sixty-eight. If your college has more than this number of programs, it will be necessary to provide students with a complete listing in hard copy, off-line. For the convenience of most students a listing of the most popular programs will be displayed on the screen (with directions for viewing a complete listing in hard copy at the side of the terminal). For the sake of aesthetics, grouping, and ease of reading, it is suggested that the on-screen listing be kept short, about forty programs.

   Put an asterisk next to the programs you want displayed on the screen.

Exhibit 5 (continued)

PROGRAM	KEY COURSE	LABEL

Exhibit 5 (continued)

PROGRAM	KEY COURSE	LABEL

(over)

Exhibit 6

PAGE 1 REQUEST SHEET

School ____

Please fill in the following form in order that we may send you sufficient numbers of page 1 of the Student Questionnaire. List in the left column the names of all the key courses (see Prediction System Manual for an explanation of "key course") for which the Student Questionnaires will be administered. List in the right column the number of students you anticipate will be enrolled in each key course. (Use back of page if needed.)

KEY COURSE	ESTIMATED NO. OF STUDENTS ENROLLED

Total ______________________

When complete, return this request sheet and Form A to ETS in the enclosed envelope.

Exhibit 7

000745

FORM

B

IDENTIFYING IMPORTANT GRADE FACTORS

FOR

KEY COURSE ______________________________
(Name) (Number)

SIGI

System of Interactive Guidance and Information

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Exhibit 7 (continued)

DIRECTIONS

Completion of this form requires describing the content and activities of this course, and selecting (from a list of Standardized Grade Factors on the opposite page) the competencies that instructors believe are required if a student is to do well in this course. It is suggested that instructors who teach sections of this course be consulted in identifying grade factors. Keep in mind that after reading each grade factor, students will be asked to rate themselves on the competencies described.

1. Grade Factor 1: COMMITMENT TO THE PROGRAM.

A factor called COMMITMENT TO THE PROGRAM is a fixed part of the description of all courses. It is described as follows:

> An important factor is your COMMITMENT TO THE PROGRAM. COMMITMENT means having the feeling that you will complete the whole program which the key course is a part of. You feel the program is right for you, and you are willing to do all the work, even in courses that do not interest you, in order to complete the program.

2. Grade Factor 2: INTEREST IN SUBJECT AREA.

A second factor called INTEREST IN SUBJECT AREA has also been identified as important for getting good grades in all courses. For present purposes, INTEREST IN SUBJECT AREA is described by the content and activities of the course. In the space below, describe the course content and/or activities in a way that will help students evaluate their interest in the subject. DO NOT include information about prerequisites. (Prerequisites can be included as grade factors 3 or 4.) See examples of course descriptions on opposite page.

RESTRICTION: Maximum of 5 lines of 79 characters per line. Each letter, number, punctuation mark, and space between words counts as one character.

1
2
3
4
5

3. Grade Factor 3: ____.

Select a third factor from the list of Standardized Grade Factors and write the name of it in the space next to "Grade Factor 3." If you feel that a factor not included on the list is more important than any of those listed, use the space below to describe it. See example of a unique grade factor on back page.

4. Grade Factor 4: ____.

Select a fourth factor from the list of Standardized Grade Factors and write the name of it next to "Grade Factor 4." Follow the same suggestion as for Factor 3.

Exhibit 7 (continued)

Examples of COURSE DESCRIPTIONS

AUTOMOBILE MECHANICS (AUTO 210)

You learn to rebuild, repair, and make performance modifications on automobile engines. You get practice in removing an engine, taking it apart, cleaning, measuring, and reboring. You also reassemble it, make adjustments, and put it back into the automobile.

GENERAL ZOOLOGY (BY 120)

You listen to lectures on zoo and park philosophy and history. Animal keepers, park rangers, and others visit the class to tell you about job opportunities. At the college's zoo, you landscape habitats, keep records, guide visitors, and help maintain zoo facilities. Once a month you take a field trip to a nearby zoo.

STANDARDIZED GRADE FACTORS

GOOD READING ABILITY

GOOD READING ABILITY is important for doing well in this course. You should be able to read fast without loss of comprehension, to locate important facts by skimming, to see how the material is organized, and to tell which ideas are major and which are minor. There are many reading assignments in this course.

WRITING ABILITY

This course requires a good deal of WRITING ABILITY. You should have a good grasp of English grammar and spelling, and should be able to express your ideas fluently in clearly organized papers. Many assignments will require this skill.

SPEAKING ABILITY

SPEAKING ABILITY is important for success in this course. You should feel confident and at ease when giving reports, participating in panels, and making speeches. Your presentation should be logical and clear.

ABILITY TO THINK LOGICALLY

The ABILITY TO THINK LOGICALLY is important for success in this course. You should be able to examine and analyze evidence, recognize which facts are important. You should also be able to recognize the steps and missteps in the reasoning process and reach conclusions that are consistent with the evidence.

CREATIVITY

CREATIVITY is an important factor for success in this course. You should have imagination and the ability to respond to a stimulus or need in an original, clever, or unusual way.

WORK INDEPENDENTLY

Much of the work in this course requires that you WORK INDEPENDENTLY. You should be competent enough in the appropriate technical skills or knowledge to work on your own. You should feel comfortable about completing assignments without outside help.

WORK IN GROUPS

Many of the class assignments depend upon WORKING IN GROUPS. You should be used to working with other people and feel comfortable with them.

HIGH MOTIVATION

HIGH MOTIVATION is necessary for success in this course. Merely attending, listening and doing assignments is not enough. You should also be willing to do more than is actually assigned.

SELF-IMPROVEMENT

Students who succeed in this course are those who see the need to improve themselves in the area covered by the subject matter.

ORGANIZATIONAL ABILITY

A high degree of ORGANIZATIONAL ABILITY is essential for success in this course. You must be able to take apparently independent events or facts, see how they are related, and organize them in a meaningful way.

QUANTITATIVE SKILL

This course requires a great deal of QUANTITATIVE SKILL. You should have the background and ability in mathematics to handle without difficulty the subject matter of this course.

MEMORIZATION

Ability to MEMORIZE is important for success in this course. You must be able to remember many facts, figures, statistics, names, places, or forms as related to the subject matter of this course.

FAST NOTE-TAKING

Accurate and fast NOTE-TAKING is important for success in this course. The material presented is complex and varied and moves very fast. For this reason you should have an organized, logical note-taking procedure.

ART PREREQUISITE

This course assumes that you already have basic skills in art. How good are your basic art skills?

(continued on back page)

ENGLISH FUNDAMENTALS
This course assumes a knowledge of basic English skills such as spelling, grammar, punctuation, etc. How good are your English skills?

MATH PREREQUISITE
This course requires solid skills in algebra. How well did you do in algebra?

LEADERSHIP ABILITY
LEADERSHIP ABILITY contributes to success in this course. You should be able to conduct class activities, influence people, and organize programs.

TYPING SKILL
TYPING SKILL is important for success in this course. You should be able to type at least 25-30 words per minute without errors.

CLASSROOM PARTICIPATION
CLASSROOM PARTICIPATION is important for success in this course. You should be willing to take an active role in classroom discussions and activities.

WORK WITH CHILDREN
The ability to WORK WITH CHILDREN is important for success in this course. You should understand children, be able to recognize and meet their needs, and enjoy spending a good deal of time with them.

MUSIC FUNDAMENTALS
A knowledge of the fundamentals of music is an important factor for doing well in this course.

MECHANICAL APTITUDE
MECHANICAL APTITUDE is important for success in this course. You should be able to handle tools, machinery, or equipment effectively or to learn how to operate them.

MATH FUNDAMENTALS
This course assumes a knowledge of basic math skills such as addition, subtraction, percentages, etc. How good are your math skills?

SPATIAL RELATIONSHIPS
The ability to visualize spatial relationships is necessary for success in this course. You should be able to see and understand how objects are related in space, and be able to apply this in design and drawing.

FINGER/HAND DEXTERITY
Success in this course depends upon a high degree of FINGER/HAND DEXTERITY. You should have good small muscle control, and the ability to make fine, accurate hand and finger movements.

GOOD EYESIGHT
GOOD EYESIGHT is a decided advantage. Students with limited or impaired vision may not do as well as those with good vision.

PHYSICAL MOBILITY
PHYSICAL MOBILITY and agility are important for success in this course. You will be expected to engage in many physical activities requiring stamina, body control, and quickness.

REGULAR HOMEWORK
Completion of REGULAR HOMEWORK assignments is a key factor for success in this course. Since each lesson builds on the one that came before, you must be willing to keep up with each assignment and not let the work pile up.

REGULAR ATTENDANCE
REGULAR ATTENDANCE is necessary. The course moves fast and much material is covered each session. Any absences will put you at a disadvantage.

Example of a UNIQUE FACTOR

UNUSUAL COSTS
One factor for success in this course is the ability to pay for materials. Unless you purchase the materials, it will be hard to succeed in this course. Costs are about $300.

Exhibit 8

SIGI
SYSTEM OF
INTERACTIVE
GUIDANCE
AND INFORMATION

EDUCATIONAL TESTING SERVICE
PRINCETON, N.J. 08540
609 921-9000

DIRECTIONS FOR COMPLETING FORM B

To the Instructor:

The SIGI staff at ETS is in the process of developing your college's Prediction system. As you may know, PREDICTION is one of the six major subsystems that make up SIGI. Its purpose is to help students evaluate their chances of success in various programs offered at your college. It can also give you and other instructors information which might help you evaluate your grading practices.

To prepare the Prediction system, we need information from you about the course named on the accompanying form (Form B: Identifying Important Grade Factors). Specifically, we need to know (1) the content and activities of the course, and (2) the competencies that you believe are required if a student is to do well in the course. This information is to be provided right on Form B.

The directions for completing Form B are given below. If you have any questions, contact the SIGI coordinator at your college.

Writing the Course Description (Grade Factor 2: INTEREST IN SUBJECT AREA)

In SIGI's Prediction system, students will be asked to evaluate their INTEREST IN THE SUBJECT AREA covered by the course named on Form B. They will make their evaluation based on your description of the course content and activities.

In the space provided on Form B, write a description of your course following these guidelines:

(1) Write the course description in the second person, as though you were telling a student what he will do if he takes the course.

Examples: "You read 10 novels by twentieth-century authors."
"You rebuild and repair automobile engines."

(2) Emphasize the major activities of the course. Be as specific as possible, but include only those activities that are fairly constant from year to year.

Examples: "You write three papers."
"You do one lab experiment per week."

(continued)

Exhibit 8 (continued)

(3) Be sure to include any unusual features of the course.

Examples: "You dissect a fetal pig."
"You prepare a multi-media presentation for
the college film festival."

(4) DO NOT include information about prerequisites. (Prerequisites can be included as Grade Factors 3 and 4.)

(5) Make sure your completed course description will fit into the allotted space in the computer memory. For maximum length, see "RESTRICTION" under #2 on Form B.

For examples of course descriptions, see Form B.

Selecting Grade Factors 3 and 4

Students using the Prediction system will also be asked to rate themselves on the factors that you identify as being important for getting good grades.

To identify Grade Factors 3 and 4, ask yourself, "What competencies are required if a student is to do well in this course?"

Read through the list of Standardized Grade Factors on Form B. In the spaces provided on Form B, write the names of the grade factors you think are most important. (NOTE: Our experience in developing Prediction systems for other colleges indicates that HIGH MOTIVATION is often a good predictor of final grades. You may want to give special consideration to selecting this grade factor.)

If you feel that a factor not included on the list is more important than any of those listed, use the space provided on Form B to describe it. See the example of a unique factor on the back of Form B.

Return your completed Form B to the SIGI coordinator at your college.

THANK YOU FOR YOUR ASSISTANCE

Exhibit 9

FORM C

DISTRIBUTION OF GRADES

KEY COURSE ______________________________
(Name) (Number)

Designate the number and percent of students who received each of the grades used at your college. This distribution should include at least 50 students who obtain a grade of A through F (not including incompletes and withdraws). If more than one instructor is teaching this course, include approximately equal numbers of students from each instructor. Pool over as many terms as necessary to get the minimum number.

GRADE	NUMBER OF STUDENTS	PERCENT
A	______	____
B	______	____
C	______	____
D	______	____
F	______	____
Incomplete	______	____
Other (Specify)__________	______	____
Other (Specify)__________	______	____
		Sum = 100

Make sure the percents sum to 100.

S I G I

System of Interactive Guidance and Information

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Exhibit 10

COMPLETED SAMPLE

B
0335

STUDENT QUESTIONNAIRE & ANSWER SHEET

Name Student (last) Typical (first) Student # 999-99-999 (ID or Soc. Sec.)

> The Guidance Research Group at Educational Testing Service is conducting a study to see how well students entering a course can predict their performance. Please assist us by filling out the following form. All information is strictly confidential and will be used for research purposes only.

SECTION 1: INFORMATION

1. Age:
   - ___ (1) 18 or under
   - ✓ (2) 19-21
   - ___ (3) 22-24
   - ___ (4) Over 25
2. Sex:
   - ___ (1) Female
   - ✓ (2) Male
3. Do you feel that you need help with English?
   - ___ (1) Yes
   - ✓ (2) No
   - ___ (3) Not sure
4. How many hours of homework and study are you planning to do per week?
   20 hours
5. Estimate your overall average in high school:
   - ___ (1) A+, A, A-
   - ✓ (2) B+, B, B-
   - ___ (3) C+, C, C-
   - ___ (4) D or below
6. Average English grade received in high school or college:
   - ___ (1) A+, A, A-
   - ✓ (2) B+, B, B-
   - ___ (3) C+, C, C-
   - ___ (4) D or below
7. Average math grade received in high school or college:
   - ___ (1) A+, A, A-
   - ✓ (2) B+, B, B-
   - ___ (3) C+, C, C-
   - ___ (4) D or below
8. Rank in high school graduating class:
   - ___ (1) Top Fifth
   - ___ (2) Upper Fifth
   - ✓ (3) Middle Fifth
   - ___ (4) Lower Fifth
   - ___ (5) Bottom Fifth
9. Size of high school senior class:
   - ___ (1) 0 to 25 students
   - ✓ (2) 26 to 100 students
   - ___ (3) 101 to 500 students
   - ___ (4) Over 500 students
10. College status:
    - ___ (1) Newly-enrolled freshman
    - ✓ (2) Other (specify number of credits completed 18)
11. Full- or Part-time student:
    - ✓ (1) Full-time student
    - ___ (2) Part-time student
12. Other than this school, have you attended any other 2- or 4-year school since high school?
    - ___ (1) Yes
    - ✓ (2) No
13. Refer to the attached list (page 6) of college programs. Write the number of your intended major or program in which you are enrolled:
    Major/Program number 104

SECTION 2: COURSE NAME & NUMBER

Write in the name and number of this course:

Intro. Business (COURSE NAME) BA 101 (COURSE NUMBER)

(Turn to page 2.)

SECTION 3: FACTOR RATINGS

(See page 3 for directions.)

	Top 1/5	2nd 1/5	Remaining 3/5ths
Factor 1:		✓	
Factor 2:		✓	
Factor 3:		✓	
Factor 4:			✓

I am planning to do 5 hours of homework and study per week for this course alone.

(When you have completed this section, turn to page 4.)

SECTION 4: SELF ESTIMATES

(See page 4 for directions.)

Put a check (✓) on the line for the grade you estimate you are most likely to receive in this course.

- ___ A+, A, A-
- ✓ B+, B, B-
- ___ C+, C, C-
- ___ D+, D, D-
- ___ F
- ___ Withdraw, Incomplete, or Other

(Tear off this page and turn to reverse side.)

SECTION 5: TEST SCORES

OFFICE USE ONLY

52 56 44 - 37 39 41

SECTION 6: FINAL GRADE

OFFICE USE ONLY

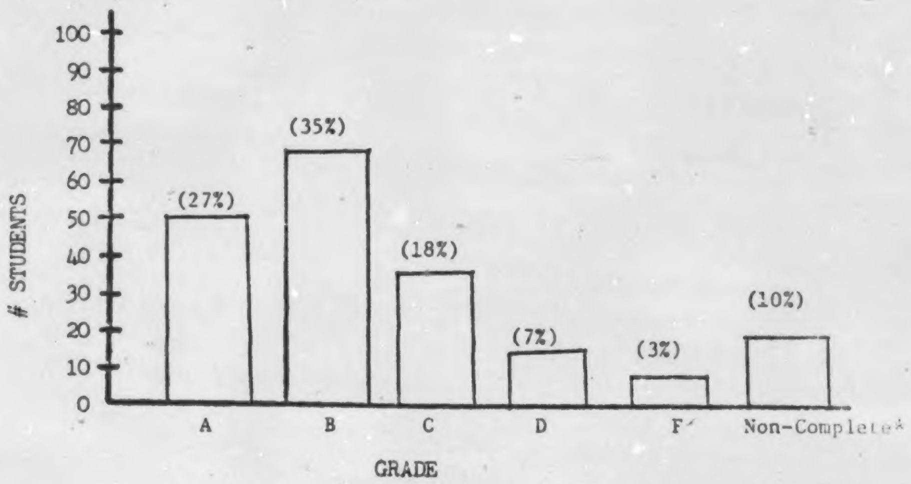
4

Exhibit 10 (continued)

[Page 2 of Student Questionnaire, printed on yellow paper.]

Here is some information to help you better estimate how well you will do in this course.

This chart shows the grades obtained by the 177 students enrolled in "Introduction to Business" (BA101).



More than one-third of the students (35%) got a B.

More than one-quarter (27%) got an A.

Eighteen percent got a C.

Only 10% of the students got below C.

*Notice that 10% of the students did not complete the course, receiving W, Inc, or R. Typically, students who receive these grades have a low high school grade point average, plan to do only a few hours of study and homework per week, and estimate that they will get a low grade in the course.

Keep this distribution in mind when you estimate how well you will do in this course.

TURN THE PAGE

Exhibit 10 (continued)

[Page 3 of Student Questionnaire, printed on pink paper.]

Here are some factors that instructors teaching this course have indicated are important for getting good grades.

Grade Factor 1: COMMITMENT TO THE PROGRAM

An important factor is your COMMITMENT TO THE PROGRAM. COMMITMENT means having the feeling that you will complete the whole program which the key course is part of. You feel the program is right for you, and you are willing to do the work, even in the courses that do not interest you, in order to complete the program.

Compared to other students, how would you rate yourself on this factor? Turn to the answer sheet, page 1, and find the section marked "Section 3: Factor Ratings." RATE YOURSELF ON FACTOR 1 and record your rating by putting a check in one of the columns: Top 1/5, 2nd 1/5, or Remaining 3/5ths.

Grade Factor 2: INTEREST IN SUBJECT AREA

Here is a description of this course:

You hear lectures on finance, marketing, communication skills, personnel administration, production, and economics. You participate in class discussions on assigned readings in textbooks, newspapers, and business periodicals. You write 3 or 4 short papers.

RATE YOURSELF ON FACTOR 2. Record your rating on the answer sheet, page 1, Section 3 next to "Factor 2."

Grade Factor 3: MATH FUNDAMENTALS

This course assumes a knowledge of basic math skills such as addition, subtraction, percentages, etc. How good are your math skills?

RATE YOURSELF ON FACTOR 3. Record your rating on the answer sheet, page 1, Section 3 next to "Factor 3."

Grade Factor 4: WORK INDEPENDENTLY

Much of the work in this course requires that you WORK INDEPENDENTLY. You should be competent enough in the appropriate technical skills or knowledge to work on your own. You should feel comfortable about completing assignments without outside help.

RATE YOURSELF ON FACTOR 4. Record your rating on the answer sheet, page 1, Section 3 next to "Factor 4."

How many hours of homework and study are you planning to do per week for this course alone? Write in a number and not a range (such as 5-10). Do not write in such statements as "as many as needed". Record your answer on the answer sheet, page 1, Section 3.

When you have recorded your 4 factor ratings and hours of homework, turn to page 4.

Exibit 10 (continued)

[Page 4 of Student Questionnaire, printed on blue paper.]

Now we would like you to estimate how well you will do in this course.

What grade do you think you will get? BE REALISTIC. Take into account what you know about your performance in high school and what you just read about this course.

Keep in mind that although students generally feel that they will do well in college because they are highly motivated, high school performance is usually the best predictor of college performance.

What grade do you think you will get in this course?

Turn to the answer sheet, page 1, and find the section marked "SECTION 4: SELF ESTIMATES." Mark your estimate in the appropriate space.

At the end of the term, your estimate will be compared with your final grade.

* * * * * * IMPORTANT * * * * * *

YOUR INSTRUCTOR WILL NOT SEE THIS INFORMATION! After you mark your estimated grade, check to see that you have written your name at the top of the answer sheet and have answered all the questions. Then, tear off the answer sheet, page 1. Fold it in half. The instructor will immediately seal all folded answer sheets in an envelope to be forwarded for data processing.

Thank you for your cooperation.

Exhibit 10 (continued)

[Page 5 of Student Questionnaire, printed on white paper.]

Programs List* (Sample)

BUSINESS

101 Accounting
102 Clerical Studies
103 Data Processing
104 General Business
105 Medical Secretary
106 Mid-Management
107 Secretarial

HEALTH RELATED

108 Nursing
109 Dental Assisting
110 Physician's Assistant
111 Nuclear Medicine Technology
112 Cardiovascular Technician

PUBLIC SERVICE

113 Child Development
114 Legal Assisting
115 Law Enforcement
116 Industrial Security
117 Corrections Counseling
118 Fire Science

TECHNICAL EDUCATION

119 Air Pollution Technology
120 Automotive Technology
121 Aviation Technology
122 Biological Parks Technology
123 Building Construction Technology
124 Drafting Technology
125 Electronics Technology
126 Graphics Technology
127 Heating, Air Conditioning, Refrigeration and Ventilation Technology
128 Multi-Media Communications Technology

CERTIFICATE PROGRAMS

129 Automotive Mechanics
130 Cosmetology
131 Emergency Medical Technology
132 General Carpentry
133 Heating, Air Conditioning, Refrigeration and Ventilation
134 Licensed Practical Nursing
135 Major Appliance Servicing
136 Multi-Media Communications Technology
137 Nurse Aide
138 Television Servicing
139 Welding
140 Work Exploration

AGRICULTURE

141 Ornamental Horticulture
142 Animal Science

SPECIAL PROGRAMS

143 Career Associate in Special Education
144 Human Service Aide
145 Recreation Leadership

---

* Use three-digit numbers for programs, beginning with 101.

Exhibit 11

B

00000

STUDENT QUESTIONNAIRE & ANSWER SHEET

BLANK

Name ______________________________ Student # ______________
(last) (first) (ID or Soc. Sec.)

The Guidance Research Group at Educational Testing Service is conducting a study to see how well students entering a course can predict their performance. Please assist us by filling out the following form. All information is strictly confidential and will be used for research purposes only.

SECTION 1: INFORMATION

1. Age:
   - ______(1) 18 or under
   - ______(2) 19-21
   - ______(3) 22-24
   - ______(4) Over 25
2. Sex:
   - ______(1) Female
   - ______(2) Male
3. Do you feel that you need help with English?
   - ______(1) Yes
   - ______(2) No
   - ______(3) Not sure
4. How many hours of homework and study are you planning to do per week?
   ______hours
5. Estimate your overall average in high school:
   - ______(1) A+, A, A-
   - ______(2) B+, B, B-
   - ______(3) C+, C, C-
   - ______(4) D or below
6. Average English grade received in high school or college:
   - ______(1) A+, A, A-
   - ______(2) B+, B, B-
   - ______(3) C+, C, C-
   - ______(4) D or below
7. Average math grade received in high school or college:
   - ______(1) A+, A, A-
   - ______(2) B+, B, B-
   - ______(3) C+, C, C-
   - ______(4) D or below
8. Rank in high school graduating class:
   - ______(1) Top Fifth
   - ______(2) Upper Fifth
   - ______(3) Middle Fifth
   - ______(4) Lower Fifth
   - ______(5) Bottom Fifth
9. Size of high school senior class:
   - ______(1) 0 to 25 students
   - ______(2) 26 to 100 students
   - ______(3) 101 to 500 students
   - ______(4) Over 500 students
10. College status:
    - ______(1) Newly-enrolled freshman
    - ______(2) Other (specify number of credits completed ______________)
11. Full- or Part-time student:
    - ______(1) Full-time student
    - ______(2) Part-time student
12. Other than this school, have you attended any other 2- or 4-year school since high school?
    - ______(1) Yes
    - ______(2) No
13. Refer to the attached list (page 6) of college programs. Write the number of your intended major or program in which you are enrolled:
    Major/Program number ____________________

SECTION 2: COURSE NAME & NUMBER

Write in the name and number of this course:

____
(COURSE NAME) (COURSE NUMBER)

(Turn to page 2.)

SECTION 3: FACTOR RATINGS

(See page 3 for directions.)

	Top 1/5	2nd 1/5	Remaining 3/5ths
Factor 1:	____	____	______
Factor 2:	____	____	______
Factor 3:	____	____	______
Factor 4:	____	____	______

I am planning to do ______ hours of homework and study per week for this course alone.

(When you have completed this section, turn to page 4.)

SECTION 4: SELF ESTIMATES

(See page 4 for directions.)

Put a check (✓) on the line for the grade you estimate you are most likely to receive in this course.

______ A+, A, A-
______ B+, B, B-
______ C+, C, C-
______ D+, D, D-
______ F
______ Withdraw, Incomplete, or Other

(Tear off this page and turn to reverse side.)

SECTION 5: TEST SCORES

OFFICE USE ONLY

SECTION 6: FINAL GRADE

OFFICE USE ONLY

Exhibit 11 (continued)

[Page 2 of Student Questionnaire, printed on yellow paper.]

Here is some information to help you better estimate how well you will do in this course.

This chart shows the grades obtained by the   students enrolled in

Keep this distribution in mind when you estimate how well you will do in this course.

TURN THE PAGE

Exhibit 11 (continued)

[Page 3 of Student Questionnaire, printed on pink paper.]

Here are some factors that instructors teaching this course have indicated are important for getting good grades.

Grade Factor 1: COMMITMENT TO THE PROGRAM

An important factor is your COMMITMENT TO THE PROGRAM. COMMITMENT means having the feeling that you will complete the whole program which the key course is part of. You feel the program is right for you, and you are willing to do the work, even in the courses that do not interest you, in order to complete the program.

Compared to other students, how would you rate yourself on this factor? Turn to the answer sheet, page 1, and find the section marked "Section 3: Factor Ratings." RATE YOURSELF ON FACTOR 1 and record your rating by putting a check in one of the columns: Top 1/5, 2nd 1/5, or Remaining 3/5ths.

Grade Factor 2: INTEREST IN SUBJECT AREA

Here is a description of this course:

RATE YOURSELF ON FACTOR 2. Record your rating on the answer sheet, page 1, Section 3 next to "Factor 2."

Grade Factor 3:

RATE YOURSELF ON FACTOR 3. Record your rating on the answer sheet, page 1, Section 3 next to "Factor 3."

Grade Factor 4:

RATE YOURSELF ON FACTOR 4. Record your rating on the answer sheet, page 1, Section 3 next to "Factor 4."

How many hours of homework and study are you planning to do per week for this course alone? Write in a number and not a range (such as 5-10). Do not write in such statements as "as many as needed". Record your answer on the answer sheet, page 1, Section 3.

When you have recorded your 4 factor ratings and hours of homework, turn to page 4.

Exhibit 11 (continued)

[Page 4 of Student Questionnaire, printed on blue paper.]

Now we would like you to estimate how well you will do in this course.

What grade do you think you will get? BE REALISTIC. Take into account what you know about your performance in high school and what you just read about this course.

Keep in mind that although students generally feel that they will do well in college because they are highly motivated, high school performance is usually the best predictor of college performance.

What grade do you think you will get in this course?

Turn to the answer sheet, page 1, and find the section marked "SECTION 4: SELF ESTIMATES." Mark your estimate in the appropriate space.

At the end of the term, your estimate will be compared with your final grade.

* * * * * * IMPORTANT * * * * * *

YOUR INSTRUCTOR WILL NOT SEE THIS INFORMATION! After you mark your estimated grade, check to see that you have written your name at the top of the answer sheet and have answered all the questions. Then, tear off the answer sheet, page 1. Fold it in half. The instructor will immediately seal all folded answer sheets in an envelope to be forwarded for data processing.

Thank you for your cooperation.

Exhibit 11 (continued)

[Page 5 of Student Questionnaire, printed on white paper.]

Program List

Exhibit 12

Directions for Administering the Student Questionnaire

TO THE INSTRUCTOR

This questionnaire contains information about the course you are teaching. Students in your class and in the classes of other instructors teaching this course are being asked to answer questions about themselves, then to read the information presented on pages 2 and 3 of the questionnaire and use it to make an estimate of their final grade in the course.

At the end of the term, final grades will be collected for students completing this questionnaire. An analysis will be made of the data collected in this questionnaire to develop prediction equations. These prediction equations, along with others obtained in a similar manner, will be used to help students predict their performance in various key courses at the college.

S I G I

System of Interactive Guidance and Information

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Exhibit 12 (continued)

Administration Date

Please administer to students on the first day of class before you explain the manner in which you will teach the course and what the assignments will be.

Time

You should allow approximately 20 minutes to administer the questionnaire to an average size class. Please set aside time at the beginning of the class period to ensure that students will have sufficient time to complete the questionnaire.

Answering Questions

Answer all students' questions. Our intent is to get complete and accurate information. If a student does not understand a question (e.g., rank in class), explain as best you can. If students do not have the information requested (e.g., rank in class) have them make their best estimates.

Directions

1. Distribute one questionnaire (5-pages) to every student in the class.

2. READ: I will now read what is printed in the box at the top of the first page:

> The Guidance Research Group at Educational Testing Service is conducting a study to see how well students entering a course can predict their performance. Please assist us by filling in the following form. All information is strictly confidential and will be used for research purposes only. I will not see your answer sheet.
>
> The first page of this questionnaire is also your answer sheet. Tear this page off. You will record all your answers on this page.
>
> On the top line, print your name, last name first. Next, write in your college identification number. If you do not know your college identification number, leave it blank.

NOTE: Social security number is used only if this is the number used by the college to identify students.

Exhibit 12 (continued)

3. Directions for completing SECTION 1: INFORMATION.

READ:

> Locate SECTION 1: INFORMATION on the left side of your answer sheet. Answer all questions in this section; DO NOT LEAVE ANY QUESTIONS BLANK. Use a check mark (✓) for each response. Do not make more than one check mark per question. Even if you are not sure which response you want to mark, choose one that suits you best. Questions 4 and 13 require you to write in a number. Refer to page 5 when answering question 13. If your have any questions, raise your hand and I'll come around to help you.
>
> Stop when you have completed all 13 questions in SECTION 1.

NOTE: Some students may have difficulty estimating their rank in high school graduating class (question 8). Explain to them that those who graduated in the top fifth received mostly A's. The upper fifth received mostly A's and B's. The middle fifth received mostly C's. The lower fifth received mostly C's and D's. The bottom fifth received mostly D's and F's. Students who have not graduated from high school should indicate what they think their rank would have been.

Wait until everyone has completed SECTION 1: INFORMATION before continuing.

4. Directions for completing SECTION 2: COURSE NAME AND NUMBER.

Write the name and number of this course on the blackboard (use a sheet of paper if a blackboard is not available). For example, write "Accounting 101" or "AC 101" but do not write the complete title: "Principles of Accounting."

READ:

> Locate SECTION 2: COURSE NAME AND NUMBER on the right side of the answer sheet.
>
> Write in the name and number of this course as I have written it on the board.
>
> Stop when you have completed SECTION 2.

Wait until everyone has completed SECTION 2: COURSE NAME AND NUMBER before continuing.

Exhibit 12 (continued)

5. READ:

   Turn to page 2 and continue to follow the directions for SECTION 3 and SECTION 4 as written. You will be recording the rest of your answers on the right side of your answer sheet in SECTION 3 and SECTION 4.

   When you have finished SECTION 3, GO ON TO SECTION 4.

   DO NOT WRITE IN SECTIONS 5 and 6; these are for office use only.

6. Directions for collecting answer sheets.

   Allow approximately 10 minutes for the students to complete SECTION 3 and SECTION 4.

   READ:

   > When you have completed both SECTION 3: FACTOR RATINGS and SECTION 4: SELF ESTIMATES, check to be sure your name and identification number are written in at the top of the answer sheet. Fold it in half with the answers concealed. I will not see your answer sheet.

   Collect all the answer sheets. Put answer sheets and all unused questionnaires in the envelope labeled "RETURN OF ANSWER SHEETS" and seal the envelope in full view of the students. Write in the course name and number, and your name.

7. Return the "RETURN OF ANSWER SHEETS" envelope to the location marked on the front.

THANK YOU FOR YOUR ASSISTANCE.

Exhibit 13*

Identification of Test Scores

Test Scores reported in Section 5 of the Student Questionnaire are standard scores on the Comparative Guidance and Placement (CGP) Program, listed in the following order:

Reading
Sentences
Mathematics
Year 2000
Mosaic Comparisons
Letter Groups
Academic Motivation

A dash indicates a missing score.

---

*Sample Cover Sheet: To be returned with completed Answer Sheets from Student Questionnaire.

Exhibit 14

RECORD OF STUDENT ANSWER SHEETS RETURNED TO ETS

Please complete this form and return
it to the SIGI staff at ETS with your
Student Answer Sheets.

Key Course	No. of Student Answer Sheets	Sample Copy of Student Questionnaire Enclosed (✓)

(Signature)

(Date)

APPENDIX B

OCCUPATIONAL INFORMATION IN SIGI: A HANDBOOK FOR DATA COLLECTION, INTERPRETATION, PREPARATION, AND DOCUMENTATION

OCCUPATIONAL INFORMATION IN SIGI

A Handbook for Data Collection, Interpretation, Preparation, and Documentation

by

Laura Pears
Amy Weber

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PLEASE NOTE:

Since SIGI is a dynamic and living project, it is subject to periodic revision. Like all other materials in SIGI, this handbook will be revised from time to time to reflect new procedures and new information. This version of the handbook is up to date as of December 1976.

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INTRODUCTION:

THE ROLE OF OCCUPATIONAL INFORMATION IN SIGI

SIGI is a computer-based System of Interactive Guidance and Information designed to help students in two-year and four-year colleges make career decisions. It has been developed at Educational Testing Service with the help of grants from the Carnegie Corporation and the National Science Foundation. Stored in a PDP-11 computer are sequences of frames, or scripts, that provide a model of guidance for career decision-making. A student interacts with the system via a cathode-ray tube (CRT) terminal, a TV-like screen on which messages are presented (or constructed). The student responds to a question or gives directions to the computer by pressing designated keys. The computer then displays the requested information or other appropriate responses on the screen.

At the core of the SIGI system is the information on some 200-250 occupations. How the material on these occupations is compiled, interpreted, documented, prepared, and continually updated is the subject of this Handbook.

Background information on the occupational information in SIGI and on the major sources of occupational information follow in this introduction. The four chapters of the Handbook, in the form of directions to SIGI research assistants for carrying out their major tasks, spell out the procedures for building and maintaining the occupational data base.

I. Occupational Information in SIGI

A. Occupations Covered

SIGI contains information on 200-250 major occupations, primarily ones which require some training after secondary school and some advance planning. It covers most professional and technical occupations, many administrative and clerical occupations, some service, craft, sales, and farm occupations, and a few semi-skilled occupations. A list of the occupations currently included in SIGI appears in Appendix A.*

B. Value Ratings

Each occupation is assigned numerical ratings for the ten SIGI values. These are the key to the SIGI Locate system which sorts occupations according to the value ratings selected by students. The ten values are: Early Entry, Income, Helping Others, Leadership, Interest Field, Prestige, Leisure, Independence, Variety, and Security. In most cases, four levels for each of these values have been differentiated. For Income, five levels are used, however, and Interest Field involves six categories and four levels.

Definitions of the ten values and the rating levels for each are included at the end of Chapter II (Exhibits II-6 through II-15). A discussion of the sources of the value ratings is given in Appendix H.

* New occupations are added to SIGI from time to time. Once entered into the computer, each occupation is checked and updated on a regular basis.

C. Questions Answered for Each Occupation

In COMPARE, students may ask specific questions about three occupations at a time. Answers to the 28 COMPARE QUESTIONS for each occupation comprise the occupational write-up, the core of SIGI's occupational information system.

A list of the 28 questions is included in Chapter II, Section II-B, and directions for answering each question follow in Section IV-A. Sources of information for each question are recorded on a set of index cards for each occupation. These documentation cards are filed in the SIGI research library.

D. Overview

In the Planning and Strategy systems, students see overviews of complete plans for entering occupations. Overviews are prepared concurrently with occupational write-ups. Sample overviews appear at the end of Chapter II (Exhibits II-17 through II-21).

E. Computer Frames

The information in SIGI must conform to a strict format to comply with space restrictions on the computer disk. The general format is explained in Chapter II, Section II-A. Computer printouts of all occupational write-ups are kept in the SIGI research library.

II. Major Sources of Occupational Information

A. The Occupational Outlook Handbook

The *OOH*, published by the U. S. Bureau of Labor Statistics, is the basic source of information for some 800 occupations in the United States. It contains definitions of job titles, descriptions of duties, educational and licensing requirements, income, hours, outlook, and so on. However, even though it is revised every two years, some of the information becomes obsolete very quickly and some is incomplete. SIGI makes use of the information in the *OOH*, and supplements it from other sources.

B. The Dictionary of Occupational Titles

The *DOT* is prepared by the Bureau of Labor Statistics. It contains standardized definitions of over 16,000 job titles, descriptions of job activities and tasks, and a numerical classification system that indicates rating levels for duties, abilities, interests, and working conditions. These ratings are sometimes useful for assigning SIGI value ratings. The *DOT* is revised at less frequent intervals than the *OOH*, approximately every ten years.

C. Occupational Briefs and Monographs

The SIGI staff regularly reviews and uses publications of the principal publishers of occupational materials. Among them are:

Alumnae Advisory Center
B'nai B'rith Career and Counseling Services
California Occupational Guides
Careers, Inc.
Chronicle Guidance Publications
G.C. Occupational Information Monographs
  (Careers in Canada)
New Jersey Guides
SRA Briefs
Vocational Guidance Manuals
William Morrow & Co.

D. Magazines and Periodicals

The SIGI staff subscribes to, or receives from the ETS library on a regular basis, over 30 journals and periodicals related to guidance and vocational information. Among the most useful are:

Manpower
Manpower and Vocation Education Weekly
Monthly Labor Review
Occupational Outlook Quarterly
Vocational Guidance Quarterly

Copies of pertinent newspaper and magazine articles are filed. Psychological and sociological studies of occupations are especially noted.

E. Professional Associations

Professional associations and unions often prepare books and pamphlets describing occupations and may conduct membership surveys. Executive directors and research staff members of these organizations can be excellent sources of information on many aspects of working conditions and tasks performed. A card file is maintained of the names, addresses, and telephone numbers of professional associations or unions for most occupations in SIGI.

Representatives of national organizations or professional associations are often asked to review completed occupational write-ups.

F. Other Government Sources

Many federal and state agencies collect data on employment, income, and licensing regulations in various fields, and SIGI has a file of important names and phone numbers of these government agencies.

The SIGI research staff also receives news releases and notification of all Bureau of Labor Statistics publications (in addition to three major periodicals regularly received, Manpower Magazine, Monthly Labor Review, and Occupational Outlook Quarterly).

G. ETS Library

The ETS library subscribes to many magazines related to occupational guidance and has on its shelves many books and general references useful to SIGI. Books and periodicals from other libraries may be obtained through inter-library loan.

When the library's new acquisitions list is circulated, the SIGI staff checks for relevant items.

In addition, the following indexes to journal articles are checked periodically:

ARM (Abstracts of Research Materials in Vocational and Technical Education)
Sociological Abstracts
Psychological Abstracts
Government Reports

CHAPTER I

COLLECTING AND STORING OCCUPATIONAL INFORMATION:

THE SIGI LIBRARY SYSTEM

The SIGI library and cataloging system were devised so that research assistants would be able to (1) check documentation of information quickly, (2) know what materials are already on hand, and (3) catalog new materials so that they can be retrieved for use in preparing new write-ups or updating.

I. Contents of Library

The library consists of source materials for occupational information currently being used in SIGI:

- brochures, pamphlets, and xeroxed pages from bulkier publications which are filed in a file cabinet alphabetically by the SIGI title for the occupation;
- source books, such as the OOH, the DOT, career books too large for the file, other guides and directories, and boxes of back issues of magazines kept on the book shelves; and
- address, bibliography, and documentation cards kept in a card catalog.

II. Library Locations

A. Notebooks

Contain the latest printouts of occupational write-ups arranged alphabetically by SIGI title. (See Appendix A for Alphabetical List of SIGI Titles.)

B. Card Catalog

1. Bib Cards:
   Filed alphabetically by title of publication, since most publications are ordered by title.
2. Documentation Cards:
   Sets for each SIGI occupation are filed alphabetically by SIGI title.
   Each set contains a card for every question in COMPARE, arranged in the order of the questions. Documentation for the Planning System Overview is also included in some cases.
3. Publications "On Order":
   Filed alphabetically by title.
4. "Unread Material":
   a. Occupations, General Information
   (filed by occupational title)
   b. $ Information
   (filed by occupational title)

5. Subject Cards:
Subject cards are kept for all salary surveys and for materials not filed in the subject folder (e.g., oversized materials kept on the shelves and publications available in the ETS library).
Category dividers for subjects are in alphabetical order.
Cards behind dividers are filed alphabetically by title.

C. Standing File Cabinet

1. SIGI Occupations:
Filed alphabetically by SIGI title.
A few files contain general information, e.g., "Health, General," "Engineers, General," etc. (See Exhibit I-2 for list of general occupational files.)

2. Subject File:
General materials such as "Salary Surveys, Many Occupations," "Prestige Study," etc. (See Exhibit I-1 for list of subject files.)

3. Proposed Occupations to be Added to SIGI:
Filed alphabetically by proposed title.

[NOTE: A separate file contains high school-level occupations. These materials are saved, but not solicited or cataloged.]

D. Shelves

1. Books and Oversized Publications:
Filed alphabetically by title.

2. College Catalogs:
Filed alphabetically by name of college.
For the most part, these are catalogs of colleges using SIGI.

3. Periodicals in Magazine Boxes:
Labeled with name and dates of magazines.
Many other periodicals are routed to us from the ETS library. (See Exhibit I-3 for list of periodicals received.)

III. Procedures

The procedures for ordering, logging-in, reading, and filing materials must be followed with care in order to prevent duplication of effort and to make sure that any information in SIGI can be traced to its source.

A. Ordering New Material

We have standing orders with some publishers of occupational materials:

- California Occupational Guide Series
  (New or updated career briefs received periodically.)

- New Jersey Job Guides
  (New or updated career briefs received periodically.)

- Vocational Guidance Manuals
  (6-9 books per year are sent on approval. They may be kept for 15 days and returned or purchased at a 20% discount.)

We also have current lists of publications offered by the major commercial publishers of occupational materials (filed under "Sources of Career Info."). New lists should be requested annually.

Updates of college catalogs must be requested annually in June.

Other materials (particularly from the BLS) may be ordered as they become available. We receive announcements of publications on a regular basis.

Reminder notes for ordering publications which appear at various times of the year are kept in a tickler file of four folders, one for each season--Fall, Winter, Spring, and Summer. Weed the files once a month.

New materials may be ordered by following these steps:

1. Before ordering, check the following to see if we already have the publication:
   a. Bib card file
   b. "On Order" card file
2. Provide secretary with name of publication and name and address of publisher. She will:
   a. Write letter for free publications.
   b. Send letter with petty cash for paid publications under $1.00. (Petty cash record will give amount.)
   c. Send purchase requisition for paid publications over $1.00. (Copy of requisition is kept by secretary until order is received.)

3. Make sure secretary types bib card when material is ordered. Bib card contains:

   a. Name of subject or occupation, "bib" for bibliography card, title, author, and date of publication.
   b. On reverse side, name and address of publisher, a notation of the date of the order, and purchase requisition number (if used).

   Example:

   Front:

   Electrical Engineer Bib

   "Electrical/Electronics Engineering,"
   New Jersey Job Guide, Dec. 1975

   Back:

   Ordered from:

   Division of Planning and Research
   N. J. Dept. of Labor and Industry
   Trenton, NJ 08625

   Ordered 4/1/76
   P.R.# (if appropriate)

4. File bib card in "On Order" card drawer, alphabetically by title.

5. Check "On Order" cards every month. Publications not received in three months should be re-ordered or reconsidered. Purchase requisition indicates price and source. For free publications, the address of the publisher will be on the back of the card.

B. Logging in Material

Publications should be marked and filed as soon as they are received, but since a complete reading usually takes a long time and cannot be done immediately, the following system was devised. It quickly provides a record of materials on hand and a convenient index of "Unread Material" to make systematic reading possible when time is available.

1. Skim

When new material is received in the mail, skim content. Throw out anything obviously inappropriate for our use. Check for a bib card in the "On Order" drawer. Bib cards for unsuitable materials should be retained with a note explaining why the source was not appropriate. This will prevent reordering. (In the case of any high school level occupational material that comes in with standing orders, file but do not log in.)

2. Check for Order Cards

For materials which may prove useful, check for a bib card from the "On Order" drawer. If this was a paid publication, notify the secretary that it has been received so that the purchase requisition may be destroyed.

3. Mark Publications

Mark the upper left-hand corner of the publication with "Rec'd/date/initials of recipient." The cover of the first page must also be marked in the upper right-hand corner to indicate where publication will be filed and which index cards should be made. Notations may be made on an index card stapled to the publication, if this is more convenient

One bib card will be made routinely for each publication when it is ordered or received, unless the publication is marked "N.C." (not cataloged). Letters, notes from phone calls, clippings, etc. are not cataloged because they are not items which we would order.

All publications which will be read at a later date will have a "dup bib" and/or a "$" card made to be included in the "Unread Materials" file. These cards are filed alphabetically by occupational title in two sections: general material and salary information. The "dup bib" and "$" cards are destroyed after the information has been used and references cited on doc cards.

Subject-matter materials and publications on proposed occupations do not need duplicate bib cards because they will be found in the files when information is needed on the subject or when a decision is made to add the occupation.

It may be necessary to mark the relevant information for the secretary to type if it is not obvious from reading the cover of the publication. Put quotation marks around the title to be used, underline the publisher, and circle the date. If the date is not on the cover, write the date or "no date" on the front cover to make it easier for the secretary to find.

In deciding how to mark a publication, refer to the samples below.

	Type of Publication	Notation
a.	Publication (already read) which deals with a single occupation.	file: (Occ. Title)
b.	Publication (to be read later) which deals with a single proposed occupation.	file: (Proposed Occupational Title) proposed occ.
c.	Publication (to be read later) which deals with a single occupation.	file: (Occ. Title) dup bib
d.	Magazine article, pamphlet, etc. (to be read later) which does not need bib card because it would never be ordered.	N.C. file: (Occ. Title) dup bib
e.	Publication (to be read later) covering many occupations, perhaps including proposed occupations. [Note: No dup bib cards will be made for proposed occupations. Instead, write the reference on a sheet of paper and include it in the proposed occupation folder.]	file: (Occ. Title or general file, such as Health, Gen.) dup bibs for: (Occ. Titles) proposed occ: (Proposed Occ. Titles)
f.	Publication (to be read later) containing salary information on one occupation.	file: (Occ. Title) $ card
g.	Publication (to be read later) containing $ info. on many occupations.	file: $ Survey, Many Occ. $ card for: (Occ. Titles)
h.	Publication (to be read later) containing general information and $ information on many occupations.	file: (Occ. Title or general file, such as Health, Gen.) dup bib and $ cards for: (Occ. Titles)
i.	Publication (for general reference) concerning a general subject rather than information related to specific occupations.	file: (Subject)
j.	Publication (for general reference) concerning a general subject rather than information related to specific occupations which is not to be filed in subject folder.	file: Outlook, Many occ. (or other subject) subject card

4. Have Index Cards Typed
   After the publication is marked, attach the bib card if it was typed previously for the "On Order" file. (See Exhibit I-4 "Procedure for Typing Cards--Bib, Subject, Dup Bib, and $," for a detailed description of the preparation of index cards.)

5. File Publications
   After index cards are made, file the publication and mark the location on all cards.

Publications Covering	Location	Mark
a. Single occupation	--folder for occupation --SIGI library shelf	--f --shelf
b. Subject material	--folder for subject --SIGI library shelf	--f --shelf
c. More than one occupation	--general folder (e.g., Health, General)	--f Health, Gen.
d. More than one occupation	--folder for one of the occupations (e.g., Pilot)	--f Pilot
e. Single proposed occupation	--folder for proposed occ.	--f Proposed Occ. Zoo Keeper
f. Books or magazines	--returned to ETS library	--ETS lib

6. File Index Cards
   File cards in appropriate card catalog drawer. Bib cards go in "Bib" drawer. Dup bibs and $ cards go in "Unread Material" drawer. Subject cards for oversized material or material being returned to the ETS library go in the "Subject" drawer.

NOTE: When filing bib cards, it may be discovered that we have a card for a previous edition of the same publication. If so, check to see whether the old edition may be thrown out. Be careful not to throw out any publication which documents information which may still appear in SIGI. If no longer quoted in SIGI, throw out both the old publication and the old bib card. When in doubt, don't throw it out--keep it!

C. Reading and Entering Information

Check the cards in the "Unread Materials" drawer regularly. All cards on one occupation are filed together alphabetically so that all new material on on occupation can be reviewed together. Notations on the cards indicate where the material is filed.

Instructions for using the material for new write-ups are given in Chapter II, Section IV, and for updating old write-ups in Chapter III. Chapter II, Section III gives instructions for preparing doc cards which serve as the index to the information used.

D. Refiling Used Publications

1. Publications on a Single Occupation

a. Write "Used/Date/Initials (of reader)" in upper left-hand corner of cover.
b. Discard the dup bib or $ card.
c. Refile the publication.
d. Check original bib card. Make sure that the original designation for filing does not need to be changed. This would be important in the case of a proposed occupation after it has been entered as a full-fledged SIGI occupation and the file moved to the SIGI occupations file drawer.

2. Publications Covering More Than One Occupation

a. The material for each occupation will probably be read at different times. Therefore, as the reading for each occupation is completed, mark "Date/Used (or Unused)/Initials (of reader)" next to the name of the occupation on the cover.

Example: File: Health, General

Occupational Therapist	3/26/76 Used ahw
Dental Lab Technician	4/12/76 Not Used lbp

b. Discard duplicate bib card or $ card for the occupation read.
c. Refile the publication.
d. When all occupations on the cover have been checked, mark "Used/Date" on the upper left-hand corner of the cover.
e. Make sure all dup bib cards and $ cards for the publication have been discarded.
f. Refile the publication.
g. Check original bib card to make sure the original filing location marked on it has not been changed.

EXHIBIT I-1

LIST OF SUBJECT FILES

Apprenticeship Programs

Basic References

Bibliographies, Book Lists

Bureau of Labor Statistics: Listings of Programs and Publications

Career Choice

Career Education

Census Data

Certification, Licensing, Many Occupations

C.E.T.A.

Civil Service Regulations & Jobs

College Courses, Many Occupations

Computers

Counseling

Data/People/Things

Descriptions of Jobs--Theory

Financial Aid

Fringe Benefits

Handicapped Workers

Hours & the Work Week

Income Distribution--U. S.

JOB Bank Summaries

Job Satisfaction--Theory

Junior Colleges, Descriptions of

Labor Force--% SIGI occupations

Language, Sexual Fairness in

Local Data

Military Careers

Minorities (Including Women)

Occupational Classification Systems

Occupational Groups or Clustering

Occupational Lists

Occupations, SIGI Additions, Survey 1975

Occupations, SIGI Additions, Survey 1974

Outlook, Many Occupations

Post-Secondary Schools, by State

Preparation and Evaluation of Occupational Information

Prestige

Psychosocial Variables

Publications Received Regularly

Salary Surveys, Many Occupations

Salary Surveys, U. S. Government

Schools Offering Programs in... (No folder but cards are in subject drawer.)

Security

Selecting Occupations for SIGI

SIGI Press Releases

Social Change Occupations

Sources of Career Information

Students, Characteristics of

Students, Occupational Interests of

Survey Methodology

Syracuse University Studies in Vocational Changes

Taxonomy

Tests, Vocational

Unions and Professional Associations

Values

Worker Traits

EXHIBIT I-2

LIST OF GENERAL OCCUPATIONAL FILES

List of general folders in SIGI occupational file drawers:

- Art, General
- Agriculture, General
- Banking, General
- Business, General
- Construction, General
- Data Processing, General
- Engineering, General
- Engineering, Outlook
- Engineering, $
- Health, General
- Hospital, General
- Insurance, General
- Management, General
- Marketing, General
- Med. Lab., General
- Nurse, General
- Paramedical, General
- Radio/TV, General
- Sales, General
- Teacher, General
- Teacher, $
- Teacher, Sec. (Gen.)

EXHIBIT I-3

LIST OF PERIODICALS CIRCULATED TO SIGI STAFF

American Journal of Sociology (contents to LP)
American Psychologist (contents to MK)
Career Education News (routed to AW)
Career World (subscription to WC)
College Student Personnel Abstracts (routed to LN)
Community & Junior College Journal (contents to WC)
Community & Junior College News (routed to LP)
Counseling Psychologist (contents to MK)
Educational Research (routed to WC)
Education Summary (routed to MK)
Focus on Guidance (routed to AW)
Harvard Educational Review (contents to MK)
Inform (routed to MK and LP)
Institute for Social Research Newsletter (subscription to MK)
Journal of Applied Psychology (contents to AW)
Journal of Career Education (contents to LP irregularly)
Journal of College Student Personnel (contents to MK)
Journal of Counseling Psychology (contents to MK)
Journal of Social Psychology (contents to AW)
Journal of Vocational Behavior (routed to MK)
Manpower (MK subscription, contents to AW)
Manpower & Vocational Education Weekly (routed to LP)
Measurement & Evaluation in Guidance (contents to MK)
Monthly Labor Review (routed to AW--Check book reviews & notes)*
New Directions for Higher Education (contents to AW)
Occupational Outlook Quarterly (subscription to MK; also routed to AW)
Personnel & Guidance Journal (subscription to WC)
Personnel Psychology (contents to LP)
Research in Education (routed to WC)
Review of Education Research (contents to MK)
Scientific American (contents to MK; subscription to WC)
Sociology of Education (contents to MK)
Vocational Guidance Quarterly (subscription to WC)
Work Life (subscription to MK)

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* Back issues are sent to us and filed here since ETS Library discards them after 2 years.

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EXHIBIT I-4

PROCEDURE FOR TYPING CARDS--BIB, SUBJECT, DUP BIB, AND $

Make a bib card for each publication, unless (a) "N.C." (not cataloged) appears in the upper right-hand corner of the publication, or (b) a bib card is already attached to the publication. For sample bib cards and standard forms for frequently received publications, see Attachment A to this exhibit.

The occupational title or subject which will appear in the upper left-hand corner of the bib card is written on the publication as follows:

file: Veterinarian
(or other occ. title)

file: Health, General
(or other subject)

Update the bib card to include the occupational title or subject, if necessary.

Other notations may appear as well, either on the front cover or the first page of the publication. In some cases, cards will be stapled to the publication. Locate the notation among the examples below and follow the procedure next to it.

For samples of the cards described below, see Attachment B to this exhibit.

Notation	Procedure
a. file: Secretary	Type a bib card only, unless it is attached. Name of occ. should appear in upper left-hand corner.
b. file: Zoo Keeper Proposed Occ.	Type a bib card only, unless it is attached. Occupational title and "Proposed Occ." should appear in upper left-hand corner.
c. file: X-ray Tech dup bib	Type a bib card and a "dup bib" exactly like it except that "dup bib" will appear in the upper right-hand corner rather than "bib." The name of the occupation appears in the upper left-hand corner.

EXHIBIT I-4 (cont.)

d.	N.C. file: Psychologist dup bib	Type a dup bib card. Do not make a bib card. Name of occupation appears in upper left-hand corner.
e.	file: Health, Gen. dup bibs for: Medical Technologist X-ray Technician Occ. Therapist Proposed Occ: Dental Lab Tech.	In addition to bib card, make dup bib cards for all the occupations listed except proposed occupations. Proposed occupations should be ignored. The name of the occupation appears in the upper left-hand corner of card.
f.	file: Social Worker $ card	Make bib card and $ card just like bib card, except "$" appears instead of "bib." Name of occupation appears in upper left-hand corner of card.
g.	file: $ Survey, Many Occs. $ card for: Plumber Real Estate Agent Dentist Optometrist	In addition to bib card, make $ card for each occupation listed. $ card is just like bib card, except "$" appears instead of "bib." Name of occ. appears in upper left-hand corner of card. Ignore any proposed occupations. Salary figures would be out of date before they could be used.
h.	file: Pilot dup bib & $ cards for: Pilot Flight Attendant Aircraft Mechanic	In addition to bib card, make both dup bib and $ cards for each occupation listed. Name of occupation appears in upper left-hand corner. Ignore any proposed occupations listed.
i.	file: Outlook Many Occs. subject card	In addition to bib card, type a subject card (same as bib card, except "subject" appears instead of "bib"). Name of subject appears in upper left-hand corner.

EXHIBIT I-4 (cont.)
ATTACHMENT A

Standard forms for bib cards for frequently received publications:

Chef Bib

"Chefs and Cooks," California Occupational Guide, Oct. 1974

Florist Bib

"Floral Designer," Careers, Inc. Dec. 1973

Teacher Aide Bib

"Teacher Aide," Chronicle Guidance Publications, 1974

Advtg Copywriter Bib

"Advertising Copywriter," G.C. Occupational Monograph (Canadian), 1974

Chef Bib

"Chef," Job Fact Sheet #59, Alumnae Advisory Center, Jan. 1974

Claim Adjuster Bib

"Claim Adjuster (Insurance)," New Jersey Job Guide No. 84. Oct. 1974

EXHIBIT I-4 (cont.)

ATTACHMENT B

Standard forms for subject, dup bib, and $ cards:

Outlook, Many Occs. Subject

California Manpower Needs to 1975, Dept. of Human Resources Development, Oct. 1969

Teacher Aide Dup Bib

"Teacher Aide," Chronicle Guidance Publications, 1974

Dentist $

"Pay Rates in the Public Service," International Personnel Management Association, 1976

CHAPTER II

ADDING A NEW OCCUPATION TO SIGI

I. General Procedure

Adding a new occupation to SIGI involves four major steps: research, preparing the write-up, occupational review, and entry in the computer. Exhibit II-1 is a checklist for use in adding a new occupation to SIGI.*

The first step is research. The checklist identifies sources to be consulted. In addition, a folder may have been started for the "proposed occupation." Notes on useful general references not mentioned on the checklist may be included in the folder. Also the directions for answering COMPARE questions include specific sources to be consulted for each question. See Exhibit II-2, "Sample Letter Requesting Information" and Exhibit II-3, "Sample Letter Requesting Waiver of Fee" for help in obtaining occupational information. Phone calls are often more appropriate than letters.

The second, third, and fourth steps for adding a new occupation--write-up, occupational review, and entry on the computer--are mentioned on the checklist. The purpose of this chapter is to explain these steps in detail.

II. Format for Answers to COMPARE Questions and Overview

The 28 COMPARE questions must fit into six computer frames. In addition, a seventh frame must be prepared containing an overview of the occupation.

A. General Format

1. Each frame contains 4 to 8 items, answers to 4 to 8 COMPARE questions.
2. Each question must be answered in no more than 6 lines. Many will be answered in less.
3. Each frame may contain no more than 24 lines.
4. Each line may contain no more than 79 characters.
5. To determine line count, set margin at 0, and type until marker reaches 79.
6. To conserve characters, use only one space after periods and colons.
7. The total character count for each frame must not exceed 1022. However, the number of characters permitted in the actual write-up is different for each frame. (This is because standard phrases sometimes appear on the screen and must be counted in the total count, although they do not always appear in the write-up. Also the number of computer symbols varies with the number of questions per frame.) See Section II-B for the character count to use for each frame.
8. For the overview frame, 23 lines may be used in an emergency, but 22 is the preferred number. This includes the standard line, "For a copy press PRINT;..." After the frame has been typed, count the number of lines (including blank lines) and add this number to the total count. This accounts for space used for carriage return symbols.
9. See Appendix E, "Style Notes for COMPARE Questions and Overview."

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* For a discussion of procedures used in selecting occupations, see Appendix I.

B. Questions and Character Count for Each Frame

Frame	SIGI Question	Abbreviation	Character Count
1	1. Definition of the occupation?	Def	987*
	2. Description of the work activities?	Des	
	3. Level of skill in interacting with data, people, things?	D/P/T	
	4. Where to get more information?	Ref	
2	5. Early Entry: education required?	Ed	1008
	6. Specific occupational training?	Occ Tr	
	7. Examples of college courses?	Col Crs	
3	8. Personal qualifications?	Pers Q	1004
	9. Other requirements?	Other	
	10. Beginning salary?	Begin $	
	11. Average income? (Shows the midpoint of salaries nationwide)	Med $	
	12. Top salary possibilities?	Top $	
4	13. How salaries vary?	$ Var	997
	14. Help others: Chances to help?	Help	
	15. Leadership: Chances to lead?	Lead	
	16. Interest Field: Which field?	Field	
	17. Prestige level?	Pres	
	18. Special problems?	Sp Prob	
	19. Physical surroundings?	Phys Sur	
	20. Leisure: hours, vacation?	Leis	
5	21. Independence on the job?	Ind	1003
	22. Variety?	Var	
	23. Fringe benefits?	Fringe	
	24. National employment outlook?	Out	
	25. Where are the jobs (U.S.)?	Loc	
6	26. Security in the occupation?	Sec	996
	27. Advancement?	Adv	
	28. How many women?	% women	
OVERVIEW			1022

---

*See guide for answering "data/people/things" question for special instructions which affect the character count for this frame.

III. Documentation

The information used in each write-up must be documented, question by question. To aid in this process, reference materials should be marked, if possible, as they are read and used, so that the exact location of the information quoted is recorded. This is especially important in the case of salary figures which may be taken from a table or chart containing other information. Marking is done by underlining sentences and/or making marginal notes which are abbreviations of key words in the questions. (See Section II-B for abbreviation for each question.)

A 3" x 5" documentation card (doc card) is made for each COMPARE question. All doc cards for one occupation (except the reference card) are filed as a set alphabetically by occupational title in the card file drawers for doc cards. (The reference card is filed in the card file for addresses.)

Each doc card may list one or more sources used in the 6-line answer to the COMPARE question. The entry should identify the title, publisher and date of the source. If no notation is given for a filing location, it is assumed that the material is filed in the folder for the occupation. If the publication is filed on the shelf, or in a folder for another occupation, this should be noted after the entry. Sources may include notes on phone calls kept in the folder.

The penciled date at top center of the card indicates the last date when the answer was revised. When a change is made on an old card, add the name of the new source, and change the penciled date at the top. Either add the new reference to the card or make a new card. (Sometimes the old card may have information which should be retained. In that case, staple the old card behind the new card.)

Example:

Occ Train 5/74 Flight Engineer

Ed 3/76 Flight Engineer

Def 4/76 Flight Engineer

3" x 5"

"Flight Engineer," SRA Brief, 1971, p. 1.

OOH, 1974-75, p. 292

Opportunities in Travel Careers, 1976, p. 47, shelf

2/14/75 phone call to Mrs. Goldman,
Am. Airlines (212-557-1234)

IV. Guide for Preparation of Write-Ups

A. Directions for Answering COMPARE Questions

Students see the answers to the COMPARE questions for three occupations at a time; therefore the style, format, and information included should be fairly uniform. In addition, space limitations have made it necessary to develop uniform ways of getting as much information as possible into a small space.

As a first step, use the Dictionary of Occupational Titles to obtain basic information on the occupation. Take notes as suggested in Exhibit II-4.

Question-by-question directions follow.

1. Definition of Occupation?

a. Check these sources: materials in folder
Dictionary of Occupational Titles (DOT) (See Exhibit II-4.)
Occupational Outlook Handbook (OOH)

b. Directions:

The definition should classify the occupation in a general field of activity and distinguish it from similar occupations. If two related occupations are included in the title (for example, Interpreter/Translator), both should be defined and the difference between the two should be made clear.

If an occupation can be defined at several levels, use the level for which community or 4-year college training would be most appropriate as the basic definition and give information about how the higher or lower level occupations are different.

For example, Chef/Cook was defined in terms of a chef or head cook, but gives information on short-order cook as an example of the lowest level of the occupation. Surveyor was defined at the level of party chief or ordinary surveyor used by the OOH, but distinguished from a registered or licensed land surveyor at a higher level and from rodman and instrumentman at lower levels.

If it is possible to confuse the occupation with another similar or related occupation, add a note explaining the difference. For example, the definition of Optometrist includes the sentence, "(Not to be confused with ophthalmologists, physicians who specialize in eye disease and eye surgery, or with opticians who make and fit glasses to a doctor's prescription.)"

Style note: Definitions are written in the third person singular with the subject understood.

c. Examples:

-- Interpreter/Translator

Helps people of different nations and cultures overcome language barriers. Interpreter orally translates what has been said into another language. Translator transfers meaning in written form from one language to another.

-- Nurse, Registered

A professional nurse who administers medical care to patients under the direction of a physician. Only registered nurses may give patients drugs prescribed by the doctor.

2. Description of Work Activities?

a. Check these sources: materials in folder
DOT (See Exhibit II-4.)
OOH

b. Directions:

The Description differs from the Definition in that it lists actual duties performed daily or at various intervals. Active verbs in the third person singular will convey the information in the fewest number of words. Begin with the most common duties, include the less common if there is room.

If two or more related occupations are included in the definition, or if there are various specialties within an occupation, the duties and activities should be differentiated in the description.

c. Examples:

-- Interpreter/Translator

Interpreter translates orally either while speaker is talking or after speaker has finished. Escort interpreter travels with visitors from foreign countries; conference interpreter covers meetings and conferences. Translator becomes familiar with subject matter and produces written translation of literary or technical materials by capturing their styles and sense; provides written summaries of meetings, books, articles, etc. Scans materials for future translations.

-- Nurse, Registered

In hospitals and clinics: administers medicines and treatments prescribed by the doctor. Observes and records symptoms and progress of patients. Prevents disease, promotes health and rehabilitation by teaching patients how to care for themselves. In public health, school, community, and industrial settings: plans and carries out projects to diagnose and prevent diseases. Provides patient care outside the hospital.

3. Level of skill in interacting with data, people, things?

   a. Check these sources: DOT # (from OOH or DOT; see Exhibit II-4.)
      materials in folder
      OOH
      DOT

   b. Directions:

   Conveniently the DOT has set up a code for classifying occupations which can be used here. The three digits following the decimal point in a DOT number are ratings for level of interaction with data, people, and things, in that order. For SIGI the numbers must be converted to a three-word classification--high, medium, or low--similar in most respects to the Ovis classification (1970 article filed in Data/People/Things subject file.). A chart indicating how the numbers and activities fit into SIGI's high, medium or low classifications is given in Exhibit II-5, which also includes a thesaurus of verbs to be used to describe activities at each level.

   Follow this procedure:

   1) Use the chart in Exhibit II-5 to determine whether the DOT numbers would be classified as high, medium, or low.
   2) Find words which describe the job activities of the occupation. See if they correspond with the words used for the DOT numbers on the chart in Exhibit II-5.
   3) If they correspond, decide on a few words to qualify the high, medium, or low level for the occupation in question. Use descriptive adjectives, action verbs, or graphic phrases. Keep them short. Try to use words from the chart which would be synonyms for the words in the career descriptions. Data, people, or things are understood to be objects of the action. Use the most typical activities for a person midway in the career.
   4) If the level of interaction, as indicated by job descriptions, seems to differ from the level indicated by the DOT number, use these guidelines to determine whether a change should be made.

      a) Try to determine what is most typically true of a worker in the field.
      b) Determine the level of interaction rather than the time spent in an activity. However, time spent may be an additional consideration.
      c) Change rating only if there is a radical departure from the DOT level. For example, although the DOT gave a low rating to the level of interaction of musicians with "things," it was felt that musicians make precision use of musical instruments and the level should be changed to "high."
   5) If a write-up covers related occupations or sub-occupations, the level of interaction with data, people, or things might be different for the various sub-occupations. When two levels of D/P/T are possible, use the level assigned by the DOT and explain any discrepancy in parentheses. (See example below.)

c. Examples:

-- Accountant

LEVEL OF WORK WITH:
Data: high--design systems, analyze, evaluate, record, compute.
People: low--little direct interaction. (Medium for CPA who may confer with clients.)
Things: Not related to work activity.

-- Architect

LEVEL OF WORK WITH:
Data: high--plan, analyze, solve problems.
People: medium--discuss, supervise, present ideas persuasively.
Things: high--precision work such as model and map making, blueprint and scale drawing.

d. Documentation:

Documentation should include the DOT number (which does not appear on the computer screen), and the page number of the DOT or other source where the number was found. Sometimes the SIGI occupational title does not correspond to any one DOT title. Be sure to write down the DOT title or titles which were used and the DOT number for each.

Explain any departures from the DOT number. Documentation of the description should be sufficient to cover changes, but if a staff member was consulted, this should be recorded along with the reasons for the decision.

Data, People, Things
Musician/music teacher
(152.048)

DOT Vol. 1, 3rd Ed. p. 488 = musician(152.048)
p. 727 = teacher (152.028)

It was felt that since musicians make precision use of musical instruments, the level for "things" should be changed to "High." Conference with MK on 6/10/74

e. Line count for D/P/T:

The total count for this frame, 987, includes the phrase "Level of work with" but does not include the words "data," "people," or "things." These words must appear in the write-up followed by a colon and two spaces (rather than one) after the colon.

4. Where to get more information? (Reference)

a. Check these sources: materials in folder
OOH
Gale's Encyclopedia of Associations, Vol. I.
(in ETS Library)

b. Directions:

The answer to this question should be the name and address of a professional organization willing to send information to a student who has been using SIGI. Sometimes two organizations are listed. If there is no source of free literature, suggest that student see a guidance counselor.

If there are many organizations to choose from, select the one or two most likely to send out free career brochures or other information to the students. This may not necessarily be the organization most useful for supplying salary information, nor an organization interested in placing graduates in jobs.

Verify the scope and purpose of the organization (and incidentally the address and zip code) by phone call. This call may also be useful for obtaining additional information on the occupation.

c. Example:

-- Lawyer

The American Bar Association
1155 East 60th Street
Chicago, IL 60637

-- Science Lab Tech

Free career literature is unavailable. See your college counselor who may know about the local market and training required.

d. Documentation:

No doc card is necessary. References are kept up-to-date on file cards in the file drawer for Professional Associations. Since there are often three or four cards for one occupation, the card or cards for associations used as references in SIGI script should be marked "Reference."

At least once a year these references should be checked by phone. Indicate the date of confirmation or change by a penciled note at the top of the card.

Since references are also used for obtaining information for SIGI, names of people contacted at the organization should be noted on the card.

Example:

Prof. Assoc.
Reference

5/76

Lawyer

The American Bar Association
1155 East 60th Street
Chicago, IL 60637

Mrs. Frances Utley

5. Early Entry: education required?

a. Check these sources: materials in folder
OOH
subject folders and cards for
"Basic References"
professional associations

b. Directions:

1) State minimum requirements, but indicate other levels available, such as apprenticeships, programs in community colleges and technical schools, 4-year programs, and graduate degrees.
2) Decide on a value rating from the definitions of the rating levels of the value EARLY ENTRY in Exhibit II-6. Write the rating in the margin for the computer operator.
3) Style Note:
    a) If high school graduation is necessary, write: "High school diploma required."
    b) If high school graduation is not necessary, write: "Some high school required," or "No formal requirements."

c. Examples:

-- Interpreter/Translator

Bachelor's degree usually required. Training on the graduate level becoming more common for interpreters and translators as part of a master's or certificate program. Good background or relevant experience may allow shorter training.

-- Welder

High school diploma preferred. Further training offered by community colleges, vocational and technical schools. Bachelor's degree required for a career in welding engineering.

6. Specific occupational training?

a. Check these sources: materials in folder
OOH
subject folders and cards for
"Basic References"
"Apprenticeship Programs"
professional associations

b. Directions:

Occupational training includes the following: apprenticeships, internships, work-study experiences, government-sponsored training programs, company-sponsored training programs, summer or part-time work, and/or hobbies. Training may or may not be required.

Be sure to do the following:

1) Give as much detail as space allows.
2) Indicate time required for training.
3) Indicate skills which must be learned, especially for apprenticeships.
4) When referring to government training programs, say: "Check your state employment service for possible government-sponsored program."

c. Examples:

-- Industrial Engineer

In some schools classroom study alternates with practical experience. Also many large companies have training programs for beginning engineers.

-- Newspaper Reporter

Experience on high school and college newspaper or small weekly or daily paper is desirable. Summer internships on newspapers available for college students.

-- Physician

2-6 years internship in a hospital.

-- Teacher, Math

Practice teaching required as part of college training for public school teaching.

-- Optician

Optical technicians and dispensing opticians pick up skills through informal on-the-job training; formal apprenticeship preferred: includes practice in lensometer measurements, lens cutting, edging, drilling; supervised practice with patients; familiarity with contact lenses and artificial eyes.

7. Examples of college courses?

a. Check these sources: material in folder
OOH
college catalogs (SIGI shelf or ETS Library)
(Use College Blue Book or Counselor's Guide to American Colleges in ETS Library to find colleges which offer programs in the particular field. Then look for most recent catalog for those colleges in ETS Library collection.)

b. Directions:

The format for the answer to this question depends on the educational classification of the occupation. (See section on "Overview" for directions for assigning a classification.) Refer to the appropriate classification below:

1) PROF occupations (graduate training required):

List undergraduate and graduate courses separately.
Name courses from area of specialization first; add general courses if space allows.

It is not necessary to mention the foreign language requirement for Ph.D. Include foreign language in the undergraduate list if required for entry into the graduate program.

For dental school, medical school and veterinary school, list undergraduate courses required for entry. Other graduate programs are not likely to have such rigid requirements.

If graduate school has a special name such as School of Architecture or Law School, use the special name instead of merely "GRADUATE."

Example:

-- Lawyer

UNDERGRADUATE: liberal arts with emphasis on communication skills-- English, history, economics, other social sciences, logic and public speaking; engineering and sciences for patent law. LAW SCHOOL: contracts, property law, judicial procedure; specialize in fields such as tax, real estate, labor, criminal, or corporation law.

2) GRAD occupations (graduate training recommended):

Follow general directions for a PROF occupation.

Use the phrase "GRADUATE (desirable)" when listing graduate courses.

Example:

-- Social Worker

UNDERGRADUATE: psychology, urban problems, minority groups, problems of youth, contemporary society, deviant behavior, marriage and the family, field experience. GRADUATE (desirable): courses in topics such as social case work, social group work, community organizing and planning, social work research, psychiatry and mental hygiene, sociocultural concepts, social welfare, plus field experience.

3) BACH occupations (bachelor's degree required):

For most of these occupations, only undergraduate courses will be listed. Therefore, begin directly with names of courses.

-- Industrial Engineer

University-level math and physics, chemistry, engineering graphics, computer programming, business management, psychology, industrial engineering, individual and organizational behavior, human factors in engineering design, management and organization; cost fundamentals, production planning and control, engineering economics.

When graduate courses are mentioned, use the introduction "GRADUATE (if desired):"

Example:

-- Chemist

General chemistry, organic chemistry, biochemistry, qualitative and quantitative analysis, physics, instrumental analysis, statistics. GRADUATE (if desired): specialized work in such areas as radiochemistry, nuclear chemistry, chemical bonding, chemical thermodynamics, quantum chemistry, atomic and molecular structure, high polymer chemistry, etc.

4) SHUD occupations (bachelor's degree recommended but not required):

Separate into courses for the first two years and courses for the 3rd and 4th years.

Begin, "FIRST 2 YEARS..." Then add, "BACHELOR'S DEGREE RECOMMENDED--3RD AND 4TH YEARS...."

Example:

-- Newspaper Reporter

FIRST 2 YEARS: English, writing, journalism, news reporting and editing, sociology, political science, economics, psychology. BACHELOR'S DEGREE RECOMMENDED--3RD AND 4TH YEARS: advanced and more specialized courses in news reporting, fact finding, photo-journalism, magazine and feature writing, interpretive writing, investigative reporting, history of journalism, press law, and ethics.

5) WICH occupations (either two-year or four-year programs possible):

List 2-year and 4-year programs separately.

Example:

-- Nurse, Registered

2-YEAR PROGRAM: anatomy, physiology, chemistry, microbiology, sociology, social problems, nutrition, medical terminology, nursing (mental health, medical-surgical, pediatrics, maternal-infant, critical care). 4-YEAR PROGRAM: pre-professional biology, chemistry, microbiology, physics, psychology, sociology, professional courses involving problem-solving and decision-making in specialized areas of nursing.

6) TERM occupations (one, two, or three years of preparation beyond high school required):

There are many possibilities among the TERM occupations:

a) Occupations for which community college or technical school training is a necessity, and 4-year programs are being introduced:

Begin, "COMMUNITY COLLEGE OR TECHNICAL SCHOOL..."

Include "4-YEAR COLLEGE PROGRAMS ALSO AVAILABLE."

Example:

-- Engineering Technician

SEVERAL POSSIBILITIES. COMMUNITY COLLEGE OR TECHNICAL SCHOOL: algebra, trig., physics, eng. graphics, eng. orientation; also courses in area of specialization (aeronautical, civil, industrial, etc.) such as mechanics, surveying, materials design, machine shop, indus. processes, machine design. ON-THE-JOB TRAINING, MILITARY TRAINING, & 4-YEAR COLLEGE PROGRAMS ALSO AVAILABLE.

b) Occupations for which community college or technical school training is virtually a necessity:

Begin, "COMMUNITY COLLEGE OR TECHNICAL SCHOOL..."

Add, if appropriate, "APPRENTICESHIP PROGRAMS (or "ON-THE-JOB TRAINING") ALSO AVAILABLE."

Example:

-- Dental Hygienist

COMMUNITY COLLEGE OR TECHNICAL SCHOOL: dental and oral hygiene, anatomy and physiology, oral histology, oral pathology, dental health, dental materials and practice, radiology, chemistry, microbiology, pharmacology, and practical clinical experience.

c) Occupations for which apprenticeship or on-the-job training is preferred, but community college or technical school training is available:

Begin, "APPRENTICESHIP PREFERRED" or"ON-THE-JOB TRAINING PREFERRED."

Also include, "USEFUL COMMUNITY COLLEGE COURSES..."

Example:

-- Machinist

APPRENTICESHIP PREFERRED. USEFUL COMMUNITY COLLEGE COURSES: machine shop, drafting and graphics, drafting and design problems, technical math, mechanics, physics, materials, surveying, power devices.

-- Telephone Craftsworker

ON-THE-JOB TRAINING PREFERRED. APPRENTICESHIPS AVAILABLE. NO SPECIFIC COLLEGE PROGRAMS. USEFUL COMMUNITY COLLEGE COURSES: electromechanical or electronics technology courses, such as electrical drafting, electrical construction, electrical problems, AC-DC circuits, electronic components and circuits, applied physics, transmission and distribution, electric motor control, illumination techniques, electric codes, industrial electronics.

d) Occupations for which there are several possible routes--on-the-job training, apprenticeship, community college or technical school:

Begin, "SEVERAL POSSIBILITIES..."

Include, "APPRENTICESHIPS (or "ON-THE-JOB TRAINING") ALSO AVAILABLE," if appropriate.

Example:

-- Chef/Cook

SEVERAL POSSIBILITIES. COMMUNITY COLLEGE: quantity food preparation, principles of baking, nutrition, food cost accounting, sanitation and safety, food purchasing, handling, storage, equipment selection. PRIVATE COOKING SCHOOL: general cookery, French cuisine, banquet, buffet, institutional food service, cost control, sanitation, purchasing. APPRENTICESHIPS AND ON-THE-JOB TRAINING ALSO AVAILABLE.

e) Occupations for which no preparation beyond high school is necessary:

Begin, "NO COLLEGE WORK REQUIRED. USEFUL COMMUNITY COLLEGE COURSES:"

Example:

-- Receptionist

NO COLLEGE WORK REQUIRED. USEFUL COMMUNITY COLLEGE COURSES: typing, stenography, office practice, business communication, speech, English.

8. Personal qualifications?

a. Check these sources: material in folder
OOH
DOT (See Exhibit II-4.)
professional associations

b. Directions:

The answer is usually given in terms of character traits and abilities such as mathematical or mechanical ability, manual dexterity, neatness, a liking for details, patience, curiosity, imagination, good memory, ability to get along with others, ability to communicate orally or in writing, attractive appearance, etc. Avoid referring to high or low intelligence. When it is an important factor, as in the case of a physician, use the phrase, "outstanding scholastic achievement."

Physical health, stamina, and good eyesight and hearing may be mentioned if they are highly desirable. If a minimum level is required, it should be mentioned under "Other Requirements."

Useful or required talents may be worth including, for example the ability to play the piano.

Style note: A good way to say a person should look neat and shower regularly is, "Should make a favorable impression in manner, speech, dress."

c. Examples:

-- Advertising Copywriter

A flair for language; understanding of human behavior; imagination and originality; ability to accept criticism and make important points tactfully; ability to work with others under pressure. Helpful to be an avid reader and have a sense of humor.

-- Nursing Assistant

Desire to help others and deal with sick persons; ability to communicate well with patients and staff; stability under pressure; willingness to accept menial tasks; good health; tact; ability to follow simple directions; cheerful personality; manual dexterity.

-- Optometrist

Interest in science and math, good business sense, ability to work with people, and a strong sense of responsibility. Manual dexterity important for using delicate instruments. Hearing must be good.

-- Plumber

A knack for trouble-shooting. Mechanical aptitude, manual dexterity, and the ability to read blue prints. Work requires great accuracy and care. Good health, physical stamina, and safe working habits important.

9. Other requirements?

a. Check these sources: professional associations (often the best source for up-to-date requirements. There is no quick and easy guide to licensing requirements.)
materials in folder
OOH
subject folder and cards for "Certification and Licensing"

b. Directions:

Any requirements for licensing, certification, registry, apprenticeship, or membership in a professional association should be mentioned here. Sometimes U. S. citizenship, age, height, or weight requirements are set by law and should be stated.

If there are no formal educational requirements, but knowledge of the field is essential for success, it should be mentioned; for example, a knowledge of plants for Nurseryman/Landscaper.

In some fields, continuing education requirements are also being legally established or recommended by professional associations. In others, it may simply be important to keep up with current research or update skills. Avoid the term "continuing education" in the write-up which may simply mean adult education. Use other appropriate explanations.

Useful or required skills (such as typing) are not considered personal qualifications and should be mentioned as requirements.

The need for capital to open a business or submission of a portfolio should also be mentioned.

Other kinds of requirements could include supplying own tools, having a driver's license, not having a felony record. These requirements should be mentioned only when they are crucial to the occupation; for example, a driver's license for a social service aide, personal tools to be supplied by a plumber.

c. Examples:

-- Advertising Copywriter

Expected to be able to type. Portfolio is required.

-- Nursing Assistant

None

--Optometrist

All states require optometrists to be licensed (usually must pass written, oral, and practical exam). Most states require optometrists to take some courses every year to keep with new developments in the field. CHECK REQUIREMENTS FOR YOUR STATE. Considerable capital necessary to open own practice.

-- Plumber

Usually must be between 16 and 25 to become an apprentice; after 5 years must take an exam on plumbing skills and local building codes to become licensed journeyman: must have 3-4 years of experience and pass advanced exam to become master plumber and do contracting. Usually provide own hand tools; driver's license.

INCOME (National Figures)

10. Beginning salary?
11. Average income? (Shows the midpoint of salaries nationwide)
12. Top salary possibilities?

(Since these three questions are closely related, and information must be handled in the same way for all three, general directions will be given for selecting sources and writing up the information for all three categories of income, followed by specific directions for each category.)

a. Check these sources: material in folder
folder and cards for
"Salary Surveys, Many Occupations..."
professional associations and sources suggested by them
OOH (last resort--call writers for sources of most recent information.)

National salary surveys conducted by professional associations, unions, or the Bureau of Labor Statistics are preferred sources. Local data cannot be assumed to be typical because pay scales vary widely by geographic area and by employer. (What the local Princeton beauty parlors pay is not adequate information.) When the local data section is added to SIGI, however, it will include statewide salary information for the state where the particular SIGI user college is located.

Try for primary sources rather than someone else's review or summary. If figures are given over the phone, ask to have published material or a xerox of relevant pages sent along for filing as documentation. Surveys are often very expensive ($40-$50) but most organizations will waive the fee because SIGI is performing a service for students. (See Exhibit II-3 for sample letter requesting a waiver of fee.)

Check the total number and status of workers included in a given survey. (A salary study of an association's membership is not adequate if its membership is a tiny segment of all the workers in that occupation.) Occasionally a well-selected small sample, such as the University of Texas National Survey of Hospital Salaries, is representative. If the sample is small, find out on what basis it was selected.

Do not use data more than two years old. Avoid OOH figures for this reason. They are usually three years old by the time a new edition is off the press.

If an occupation is one for which information is unusually hard to get, it may be necessary to use estimates from knowledgeable persons in the national associations. OOH figures adjusted for inflation could be used as a back-up source in such cases. Other last resort sources could be statewide data, information for one large representative industry, or a very small sample. As a very last resort, see Occupational Characteristics from 1970 Census (large white volume on shelf) which contains 1970 income figures on a vast number of occupations. An estimate for the year desired can be computed from this base year.

b. General Directions:

Salary information should be given in as much detail as space allows. It should be consistent with the amount of education described earlier in the write-up as well as with information on location and advancement. For example, if people in an occupation work for the federal government or teach in colleges, information on federal earnings and salaries of college teachers should be included. Differences between union and non-union rates should also be noted if available. Top salary information should include earnings for positions mentioned under advancement.

Give annual salary rates. These can be computed from hourly, weekly, or monthly rates by using a conversion chart. (See Appendix D.) In the case of laborers usually paid by the hour, give the hourly rate and the computed figure for a year at that rate. Give ranges, when available. Variation in earnings can be mentioned, but must be repeated under question 12 on salary variability. Income or wages should be written "per year" or "per hour" and NOT "an hour" or "a year." Use a comma in salary figures over $10,000; for four-digit figures, do not.

Avoid the use of technical terms such as median and mode in the write-up. Too much qualification can cause confusion. Be as technical as possible on the doc cards, however; tell exactly how the figures were arrived at.

When reliable national salary figures are not available, it may be necessary to substitute other data. Always qualify the figures by using such phrases as:

> "Estimated average..."
> "Limited data show..."
> "Limited data suggest..."
> "Figures from selected cities indicate..."
> "Only figures available are..."
> "No information available; scarcity of jobs forces many to do supplemental work." (as for actor)
> "Income uncertain." (as for free-lance artist, etc.)
> "NOTE: Income varies widely." (as for farmer, etc.)

Finally, be sure to date all salary information in SIGI. Students should know whether they are comparing data from the same or different years. Use date of data collection (NOT date of publication). Be sure figures are not more than two years old. Follow this form:

In most cases where there is only one date per category--beg., med., top--the date will appear at the end, after the final period, with only one space preceding it. For example: "$8000 for musicians with bachelor's degree. (1973)" In some cases, just to confuse the issue, two dates are required for one category. When that happens, the date will appear as part of the sentence. For example: "$8000 for musicians with bachelor's degree (1973 data). $9000 for musicians with master's degree (1974 data)."

c. Directions for each income category:

1) Beginning salary?

Beginning salary is not necessarily the lowest salary in the occupation. The beginning salary in one state may be much higher than the beginning salary in some other state. If possible give a national average for beginners and the range from low to high. Levels of occupations which are indicative of beginner's pay include:

recent graduate
trainee
apprentice
inexperienced worker
instructor

2) Average income? (Shows the midpoint of salaries nationwide) (The word "average" is used because it is easier for students to understand than the word "median." "Average" is used loosely in the write-up to mean average or median.)

This is the most important of the three income categories because it is used for assigning the value rating for Income. (See Exhibit II-7 for directions for assigning Income rating.) Write the numerical rating in the margin next to the answer for Average Income.

Although ideally we would like to rate Income on the basis of a national median (midpoint) statistically computed for all persons in an occupation, this figure is usually impossible to get. Actually we are simply trying to express a central tendency for the occupation and to use a figure which can be obtained and used as a basis for comparison with other occupations.

Be aware that the following terms are not identical, though similar, and if any figure but the median is used, it should be qualified.

Mean = The average income.
Median = The midpoint of income (half of the group are above, half below). The median is preferred to the mean because it is less affected by small numbers of extreme deviations.
Mode = The range where the greatest concentration falls. There may be more than one modal range (one high, one low). Sometimes the range within which 50 percent of the group falls is given.

The midpoint, or median, is not always easy to determine. Sometimes figures are given for different levels of an occupation, but unless it is known how many workers there are at each level, it is impossible to know where the midpoint would be. For example, the State Salary Survey gives median starting salaries for the occupations it surveys, and median maximums, but they have no data on total numbers receiving the minimums or the maximums. In that case, average the minimum and the maximum to arrive at a central tendency. Explain on the doc card that it is not a true median but "the average between the average minimum and the average maximum." For the write-up, simply use the phrase "estimated average." Sometimes the only figure we can find to express a central tendency is a middle level for the occupation, for example:

worker with 5 years of experience
worker with 10 years of experience
journeyman
associate professor

When these are used, they must be specified.

3) Top salary possibilities?

We would like to give an idea of what most people eventually earn in the occupation as well as the TOP possibilities. This may mean an average maximum, or figures for those with over 25 years of experience, or the top levels mentioned in advancement, such as administrator, full professor, master plumber, or a few stars or famous people in the field.

Use whatever information on top pay is available.

d. Examples:

-- Telephone Craftsworker

Begin:

Minimum starting salaries for entry level craft positions range from $120.50 per week ($6300 annually) to $177 per week ($9200 annually). (1974 data)

Median:

Average salary for all telephone craftsworkers is $10,500 per year. (1974 data)

Top:

Highest salaries for top level craft positions range from $225 per week ($11,700 annually) to $250 per week ($13,000 annually). (1974 data)

-- Teacher, Math

Begin:

Average minimum salaries in public school systems with enrollments over 6000: $8200 with B.A.; $9100 with M.A. (1974-75 data) In private schools most teachers begin at $6900 (1975-76 data).

Median:

Overall average for public schools: $11,500 (1974-75 data). In private schools: $9800 (1975-76 data).

Top:

In public schools: maximum established salary for highest levels of experience and education is $20,000 or more in some parts of the country (1974-75 data). In private schools: range from $14,500 to $24,000 (1975-76 data).

13. How salaries vary?

a. Check these sources: materials in folder
folder and cards for
"Salary Surveys, Many Occs"
OOH

b. Directions:

Give as much information as possible. Indicate whether there is much, little, or no variation. Variation is sometimes mentioned with salary information. Even so, it should be repeated here.

Possible variables include:

- geographical location
- education
- experience
- age
- type of employer
- overtime

Do NOT include that salaries are lower for women. Since this kind of information is not available for all occupations, it is misleading to include it for only a few.

Style Note: Since the question in COMPARE is worded "How salaries vary?" the wording in the write-up should be "Vary by..." and not "Varies by..."

c. Examples:

-- Actor/Actress

Enormous variation in pay between lesser and top performers. Overtime pay for extra rehearsals and performances.

-- Teacher, Math

In public school, vary by experience, education, and school system; no variation due to subject, grade level, or school within a system. Salaries highest in Mideast, lowest in Southwest and Southeast. Private school salaries lower than public school; vary by location and type of school.

14. Help others: Chances to help?

a. Check these sources: materials in folder
OOH
DOT (See Exhibit II-4.)

b. Directions:

This question requires a value rating (See Exhibit II-8 for definitions of rating levels for Helping Others. Read description of duties; decide which rating fits the description. Write the rating number in the margin for the computer. Include reasons for rating on doc card.)

The answer requires an "amount" statement which fits the value rating. This should be followed by a short sentence indicating how the duties of the occupation fit the definition of the rating.

c. Examples:

(4) -- Nurse, Registered

A great amount: Gives direct physical and emotional care to people who are ill.

(3) -- Soil Conservationist

A more than average amount: Provides an indirect service to the public in the environmental field.

(2) -- Beautician

An average amount: Provides a direct personal service that makes life more pleasant.

(1) -- Economist

A less than average amount: Has little face-to-face contact with the public and no direct influence on health, education, or welfare.

15. Leadership: Chances to lead?

a. Check these sources: materials in folder
OOH
DOT (See Exhibit II-4.)

b. Directions:

This question requires a value rating (See Exhibit II-9 for definitions of the rating levels for Leadership. Read description of duties and assign a rating which fits the description. Write the numerical rating in the margin beside the answer for Leadership. Documentation of rating should be included on the doc card.)

The answer requires an amount statement, followed by a short sentence relating the occupation to the rating definition.

c. Examples:

(4) -- Lawyer

A great amount: counsels and advises clients and has a great deal of influence on their decisions.

(3) -- Correction Officer

A more than average amount: Directly responsible for supervision of many inmates.

(2) -- Teacher Aide

An average amount: Activities are directed by teacher, but aide can direct and influence students.

(1) -- Bank Teller

A less than average amount: Does not direct others.

16. Interest Field: Which field?

a. Check these sources: materials in folder
OOH
DOT (See Exhibit II-4.)
subject cards for "Basic References--
Field of Interest"

b. Directions:

1) This question requires the selection of one, two, or three interest fields for the occupation and assigning a rating level for each field. (See Exhibit II-10.)

2) Enter field(s) and rating(s) on the write-up for the computer programmer. No "amount" notation appears.

c. Example:

-- Librarian

Administrative (4), verbal (4).

17. Prestige level?

a. Check this source: Siegel study in subject file, "Prestige."

Prestige is based on a 1971 empirical study by Paul M. Siegel for his doctoral thesis at the University of Chicago. (Reviewers may question prestige levels, but their information is not supported by statistical research as is Siegel's.)

b. Directions:

This is another question which requires a value rating. A copy of the Siegel study is in the subject file for Prestige. Directions for assigning ratings for the numbers are given in Exhibit II-11.

If the SIGI occupation is not included in the Siegel study, find one or more related occupations and use those ratings. Enter the names of the related occupations and their Siegel ratings on the doc card. If more than one related occupation is used, average the Siegel ratings.

Standard phrasing for each rating must appear in the write-up and must be included in the character count.

c. Example:

-- Funeral Director

A more than average amount: Rates 3 on a scale from 1 (low) to 4 (high).

d. Documentation:

Doc cards should contain the Siegel title used and the Siegel rating. If this title is not closely related to the SIGI title, explain on the doc card the reason why it was selected. If more than one title is used, the average of the ratings should appear on the doc card. Include page number of Siegel study on which the occupation is listed.

Prestige Lawyer

Lawyers and Judges 75.7
Siegel, p. 2

Prestige Speech Pathologist/
Audiologist

We combined nurse (61.5) and teacher (60.10 because most work in schools and need 4 years of training (at least) like registered nurse.

Nurse 61.5 - p.3
Teacher 60.1 - p.4
121.6 Av. = 60.8

18. Special problems?

a. Check these sources: materials in folder
OOH
DOT (See Exhibit II-4.)
professional associations and/or
teachers of the occupation

b. Special problems may include safety hazards (mention safety precautions needed), heavy physical labor, exposure to weather, or too little physical activity, boredom, long or irregular hours, uncertain income, and other difficulties.

c. Examples:

-- Machinist

Works around constant noise of machining tools. Danger from moving parts of cutting tools and flying particles. Most wear goggles, helmet, gloves, and protective shoes.

-- Funeral Director

Must be able to handle bodies which may be deformed or mutilated. There is a risk of contracting contagious diseases. Must be on call at all hours; work load varies. Considerable cash needed to open own business.

-- Purchasing Agent

Bears the responsibility of spending large sums of company money.

-- Singer/Singing Teacher

Competitive and overcrowded field. Many jobs are seasonal or short term. Hours irregular. Singing career may be short: voice, appearance, and popularity may be affected by age.

19. Physical surroundings?

a. Check these sources: materials in folder
OOH

b. Directions:

Indicate whether the work is done indoors or outdoors and briefly characterize the setting. This information should give students a more realistic feeling for the occupation. The answer may sometimes repeat the information given in the answer to "Special Problems."

c. Examples:

-- Automobile Salesworker

In showroom and car lot. May also travel in local area delivering cars to customers and looking for new prospects.

-- Medical Technologist

Laboratory in hospital, clinic, or office building. Laboratories are usually well-lighted, clean, and air-conditioned.

-- Welder

Indoors at factory or in welding shop which may be noisy; outdoors at construction site.

-- Wastewater Treatment Operator

May work outdoors in all kinds of weather or inside treatment plant. There may be dampness, odors, and noise from heavy machinery.

-- Legal Assistant

Office, law library, court.

20. Leisure: hours, vacations?

a. Check these sources: materials in folder
OOH
professional associations and/or
teachers of the occupation
subject folder: "Hours & the Work Week"

b. Directions:

To determine the value rating for Leisure, see Exhibit II-12. Enter the numerical rating in the margin and document the reasons for the rating on the doc card.

The answer must be introduced by the verbal equivalent for the rating, followed by an explanation of how the usual schedule for the occupation fits the rating definition.

Although working hours or overtime are often dependent on the particular employer, customs are usually similar for an occupation. Trends toward shorter work weeks usually affect all occupations proportionately. Check with professional associations.

Opportunities for part-time work may be mentioned here.

Style note: Use the form "X hours of work per week." For vacations, use "2-week vacation" or "two weeks' vacation" or "2 weeks of vacation."

c. Examples:

(4) -- Fine Artist/Private Art Teacher

A more than average amount: Usually sets own hours. May do all work at night or on weekends if artist holds another job.

(4) -- Teacher, Biology

A more than average amount: Vacation time late June to September, Christmas & spring vacations. But during school year, approximately 48 hours of work per week, including 37 hours required at school, plus extra time for lesson preparation, meetings, etc.

(3) -- Receptionist

An average amount: Most work 40 hours per week. In hospitals, beauty shops and other types of businesses, scheduled hours may include some weekend and evening work. Many part-time opportunities.

(2) -- Accountant

A less than average amount: 35-40 hours of work per week, except much longer and under heavy pressure during tax season.

-- Physician

(1)

A small amount: 60 hours of work per week, long days, and irregular hours. On call for emergencies. Specialists generally work fewer hours than general practitioners. Some doctors continue practice beyond 70 years of age.

21. Independence on the job?

a. Check these sources: materials in folder
OOH
DOT (See Exhibit II-4.)
professional associations and teachers of the occupation

b. Directions:

A value rating must be assigned. (See Exhibit II-13 for definitions of rating categories.) Enter the numerical rating in the margin and document reasons for selecting this rating on the doc card.

After stating the verbal equivalent for the rating, add a short explanation of how the pattern of supervision and decision-making for this occupation fits the definition.

c. Examples:

-- Dentist

(4) A great amount: Usually self-employed, makes own decisions and plans own work.

-- Production Manager

(3) A more than average amount: Usually makes decisions subject to general approval of management. In very large companies may be responsible to a plant supervisor and have less independence.

-- Machinist

(2) An average amount: Chooses how to do own work under direction of a supervisor and according to blueprint or written specifications.

-- Nursing Assistant

(1) A less than average amount: Works under daily supervision of registered and licensed practical nurses.

22. Variety?

a. Check these sources: materials in folder
OOH
DOT (See Exhibit II-4.)
professional associations and
teachers of the occupation

b. Directions:

A value rating must be assigned. (See Exhibit II-14 for definitions of rating categories.) Enter numerical rating in the margin of the write-up and document on the doc card reasons for selecting this rating.

After a verbal equivalent of the rating, add a few words indicating whether there is or is not variety in problems, people, or place. (Place is always singular; never use places.) Try to flesh out with details as in the Real Estate Agent example below.

c. Examples:

-- Teacher, Math

(4) A great amount: Variety in problems and people; some variety in place.

-- Real Estate Agent

(3) A more than average amount: Meets with different clients in different locations. Performs a variety of tasks.

-- Pharmacist

(2) An average amount: Moderate variety in people. Little variety in problems or place.

-- Typist

(1) A less than average amount: Some variety in people, little variety in problems or place.

23. Fringe benefits?

a. Check these sources: materials in folder
OOH
subject folder: "Fringe Benefits"
(gives standard benefits for Business, Univ., Government)
salary surveys (often contain information on fringe benefits)
professional associations
unions

b. Directions:

Fringe benefits are not given value ratings for LOCATE, but students may ask for the information in COMPARE. Unusual benefits should be mentioned first, such as long vacations for teachers, early retirement for fire fighters, discounts on travel and free uniforms for flight attendants. Most employers now provide vacations, sick leave, hospitalization, and pensions. It may be more unusual if they do not. For the self-employed, fringe benefits may not be provided, but group plans may be available through professional associations.

c. Examples:

-- Flight Attendant

Benefits vary greatly from airline to airline. Most offer living expenses when away from home, discount on flights for self and relatives, paid vacations, and hospitalization, medical and life insurance. Some airlines provide uniforms and retirement plans.

-- Teacher

Longer vacations and holidays than most other occupations. Sick leave, medical and retirement plans, personal and death absences, reduced lunch cost. Possibility of sabbatical leave with pay for a few tenured teachers.

-- Veterinarian

No formal fringe benefits for self-employed workers. Some veterinarians form an incorporated practice with 2 or 3 other doctors and organize insurance and retirement plans through this corporation.

24. National employment outlook?

a. Check these sources: OOH (preferred source)
articles in Occupational Outlook Quarterly
and Monthly Labor Review
subject folder "Outlook, Many Occupations.."
professional associations and unions
placement directors of schools

Employment outlook, which may be one of the most crucial questions for students, is difficult to predict. The statements which appear in the OOH, prepared every two years by Bureau of Labor Statistics economists, are worded circumspectly. Nevertheless these estimates are probably the best available and are prepared on a uniform basis for all the occupations included in the OOH. We should make use of them. It would be well nigh impossible for a small staff to improve on or even duplicate the process.

Four factors should be taken into account when reporting on Outlook: (1) growth rate, (2) replacement rate, (3) supply-demand, and (4) short-term conditions. The first three factors may be found in the OOH; the fourth factor may be reported by periodicals, professional associations, people in the field, or other sources.

Information in the OOH does not necessarily include all three factors. Often nothing is said about supply and demand. At the very least, our information should cover factors 1 and 2. On the other hand, information should not be limited to the 4 factors. Include any supplementary information from the OOH or other sources that will fit (for example, sub-groups for which opportunities are particularly favorable).

b. Directions:

No value rating is given for Outlook, but this information is taken into account in determining the rating for Security.

A standard format has been developed for reporting Outlook. This should be followed whenever possible. Statements about supply and demand are reported in the 1976-77 OOH in terms of employment opportunities. The introduction to the Handbook (p. 5) translates these terms into statements of supply and demand.

In addition to what is stated in the OOH, we may have information from other sources. Often this information is short-term and may differ in tone from the OOH. It may be possible to combine this information with information from the OOH. (See example of Social Service Aide below.)

If an occupation is not covered in the OOH, supplementary sources listed above must be used. An attempt should be made to cover as many of the four factors as possible.

c. Examples:

-- Instrument Repair Technician [Factors 1 & 2 covered.]

Faster than average growth through the mid-1980's compared to other occupations because of increased use of complex instruments for measurement, analysis, and control. Technicians also needed to replace those who leave the occupation. Opportunities particularly favorable in petroleum, chemicals, and medical supplies industries.

-- Systems Analyst [Factors 1 & 2 covered. Factor 2 was broken out into death & retirement vs. transfer to another occupation.]

Faster than average growth through the mid-1980's because of increased computer usage, particularly in medical, educational, and data processing services, as well as in manufacturing and small businesses. Because many analysts are relatively young, most openings will result from growth in employment rather than from need to replace those who die or retire. Some analysts will be needed to replace those who enter other occupations.

-- Teacher, Secondary School [Factors 1-3 covered.]

The supply of secondary school teachers through the mid-1980's will greatly exceed anticipated demand if past trends of teacher preparation continue. Keen competition for jobs. Fewer positions available because of decreasing student enrollment. Most openings will result from teachers leaving the profession. Outlook may be slightly more favorable for teachers of math, science, and industrial arts.

-- Social Worker [Factors 1, 3, & 4 covered.]

Rough balance anticipated between supply and demand. Possibility of increased competition for jobs in certain geographic areas. Faster than average growth through the mid-1980's compared to other occupations because of expansion of mental health programs and programs for the very young and very old. Opportunities particularly favorable in the health field for those with master's degrees. Social work positions are somewhat sensitive to economic and political changes.

-- Social Service Aide [Factors 1, 2, & 4 covered. Short-term information is stated in terms of what has happened in the past. This is integrated with information from the OOH.]

Employment growth largely depends on government funding. Many agencies have reduced their staffs or have hired over-qualified individuals in need of work. However, much faster than average growth compared to other occupations is anticipated through the mid-1980's. Aides also needed to replace those who leave.

25. Where are the jobs?

a. Check these sources: materials in folder
OOH
professional associations
salary surveys (may be broken down by type of employer)

b. Directions:

This answer, if given in enough detail, may add color to the information on an occupation.

It could include:

-- geographical location
  city or country
  North, South, or Mid-West, etc.

-- percentage employed in
  industry
  schools
  government
  self-employed

c. Examples:

-- Lawyer

75% in private practice, mainly in cities. Others in Federal government (departments of justice, treasury, veterans administration), state governments, private industries, law schools.

-- Librarian

40% are in schools, 25% in public libraries, and 15% in college and university libraries. Others work in government positions or special libraries in museums, hospitals, newspapers, law firms, prisons. Most work in urban areas, and a few travel to rural areas in bookmobiles.

26. Security in the occupation?

a. Check these sources: OOH
materials in folder
professional associations
unions
teachers of the occupation
placement directors of schools
SIGI statement on outlook

b. Directions:

Security must be assigned a value rating. (See Exhibit II-15 for definitions.) Enter the rating in the margin for the computer operator. Include on the doc card reasons for selecting the rating.

After the verbal statement corresponding to the numerical rating, add a brief statement of explanation.

Note that although outlook and demand for workers may be a factor in security, in the case of tenured occupations such as teacher, security may be high for those already tenured, while at the same time, there may be a shortage of opportunities for persons attempting to enter the field.

c. Examples:

-- Teacher, History/Social Studies

(4) A great amount: In many states, teachers awarded tenure after three years in school system.

-- Beautician

(3) A more than average amount: Demand is strong; some beauticians are union members. Automation cannot replace skilled hands and personal touch. No age limit or compulsory retirement. During recessions, however, more women may do own hair.

-- Architectural Technician

(2) An average amount: Demand is generally strong, but subject to fluctuations in the economy and the construction industry. Photo-reproduction and electronic drafting equipment may eliminate some lower level jobs.

-- Automobile Salesworker

(1) A less than average amount: Insecure and very competitive situation with high turnover. Job security also affected by fluctuations in the economy.

27. Advancement?

a. Check these sources: materials in folder
OOH
professional associations
salary surveys (These sometimes mention levels of workers.)

b. Directions:

Indicate usual steps in promotional ladder from entry levels to the top. Include experience, special skills or additional education required for advancement.

c. Examples:

-- Engineering Technician

May advance to sales or supervisory positions. Further education needed for promotion to professional engineering positions.

-- Hospital Administrator

May begin as department head or administrative assistant in large hospital or assume full responsibility at a small hospital. Advancement is in terms of increased responsibility, size of operation, and income.

-- Surveyor

May begin as rodman, advance to chainman, then instrumentman, then party chief or surveyor. Can become registered or licensed land surveyor upon fulfillment of state requirements, usually 4-8 years of experience plus exam.

28. How many women?

a. **Check these sources:**

OOH (most frequent source)
professional associations
materials in folder
salary surveys--(These sometimes include breakdowns for men and women and may give the total number of individuals in each category.)

CATALYST organization in NYC (career guidance for women)

b. Directions:

To avoid criticisms of being sexist, information on the current status of the percentage of women should be included, whether it be low or high, with some indication of whether there is a trend toward increased openings for either sex.

Give answer in percentage form when percents are available (i.e., "50% women" NOT "half women").

No date appears on the screen but the figure should be no more than two years old and should be documented on the doc card.

If information is not available in percentages, general terms will have to be used (i.e., "few" or "mostly").

Add explanatory information if available. If there is a trend toward increasing numbers of men or women, include this information and document meticulously.

Use figures for a general category (i.e., "all engineers," for electrical engineers, or "all biological scientists" for botanists) if breakdowns for special or sub-categories are not available. Be sure to make clear that you are reporting for the broader category.

(NOTE: Information on minorities such as blacks or Spanish-speaking groups will be added here when it becomes available for most occupations.)

c. Examples:

-- Chemist

10% women.

-- Secretary

95% women.

-- EEG Technologist

Most are women.

-- Clergy

5% women in protestant denominations; number of women is increasing. A few women rabbis. Women not allowed in the priesthood.

-- Police Officer

Just over 2% of full-time law enforcement officers are women. Number is increasing. In the past, women officers employed mostly in large cities, working with juveniles or women. Increasingly being assigned to wider range of duties, including patrol.

-- Botanist

10% of all biological scientists are women.

B. Directions for Selecting SIGI Title for a New Occupation

A name must be selected which will be used as the official SIGI title (for example Lawyer rather than Attorney). The character count may not exceed 33.

If there are several titles which could be used, select the more common or the more comprehensive term (for example Clothing Designer instead of Fashion Designer). If reasonable, use the same title as the OOH, so that students may refer to the OOH or DOT to get additional information.

Avoid sexist titles if possible (for example use Firefighter rather than Fireman).

Follow these specific directions:

1. Write the title at the beginning of the write-up, and on all folders and index cards.
2. Make a note of alternate titles on the cross-reference card for the occupation in the card catalog. Eventually the alternate titles will be added to the cross-reference list of occupations kept at the terminals.
3. Write names of sub-occupations on the cross-reference card, using the key located at the beginning of the file as a guide. This will help to document the fact that SIGI covers more occupations than would appear from a count of the titles.

C. Directions for Preparing Overview and Overview Page for Planning Manual

TITLE (See Chapter II, Section IV-B.)
CLASSIFICATION
OVERVIEW
POSSIBLE CURRICULA or NAMES OF CURRICULA SUGGESTED BY OTHER COLLEGES
SPECIAL NOTES
ENTRY FOR THE PLANNING SYSTEM INDEX

The Overview is a step-by-step career plan which students see in the Planning system. The plan is based on information in the write-up. It clearly outlines the best way(s) to prepare for and enter the occupation.

The Overview is incorporated into an Overview Page in Appendix A of the Planning Manual used by colleges in developing their planning systems. In addition to the Overview, this page gives the Title and Classification of the occupation (BACH, TERM, PROF, etc.), as well as Possible Curricula or Names of Curricula Selected by Other Colleges, Special Notes, and a space to record the entry for the occupation as it will appear in the Planning system index that the colleges compile as part of their Planning systems. The three latter categories may be revised with the advent of a universal planning system, but directions are given below for use in the interim.

Exhibit II-22 is an example of an Overview Page for Appendix A of the Planning Manual.

1. CLASSIFICATION

   Each occupation must be given an educational classification--PROF, GRAD, BACH, SHUD, WICH, and TERM. (See Exhibit II-6 for directions for assigning classification level.) Any documentation will appear on the doc card for Minimum Education. The classification number is the last number on the last frame for each occupation.

2. OVERVIEW

   a. Check these sources: write-ups on:
      Minimum Education
      Occupational Training
      Other Requirements

   b. Directions:

      The purpose of the Overview, as mentioned above, is to outline clearly the best way(s) to prepare for and enter the occupation. The format is flexible, but the information must fit the line and character count for the frame. (See Chapter II, Section II-A & B.)

      If an opening paragraph is used, it should state clearly what the best preparation is or what the possible routes are if the alternatives are equally viable. Community college or 4-year college is not the best preparation for some occupations. If less than community college training is recommended, do not advise students to get an Associate degree anyway.

Exhibit II-16 lists style rules for the Overview. Exhibits II-17-21 give examples of different types of Overviews.

3. POSSIBLE CURRICULA or NAMES OF CURRICULA SELECTED BY OTHER COLLEGES

For occupations already in SIGI, selected curricula are compiled from the Planning systems of SIGI users. These selections are useful to new users as they compile their Planning systems.

As new occupations are added to SIGI, research assistants should suggest possible curricula. After the occupation has been incorporated into users' Planning systems, the actual curricula chosen may be substituted for those originally suggested.

a. Check these sources: materials in folder (notes taken when preparing examples of college courses)

Alternate names for possible curricula should have been listed when first researching examples of college courses (for example, Law Enforcement, Criminal Justice, and Police Science for Police Officer).

b. Directions:

On Overview Page, change the heading from "Names of Curricula Selected by Other Colleges" to "Possible Curricula." Remove headings for individual colleges (e.g., CC1, CC2, etc.)

List obvious majors and alternate names for such majors first. Related majors should be mentioned only if considered to be equally adequate approaches to the career.

In suggesting curricula that will prepare a person for entry into the occupation, bear two things in mind: (1) Sometimes there are several different curricula that are satisfactory--e.g., English, Political Science, History, something called "Pre-Law," and several others are about equally satisfactory routes to law school. (2) Colleges often use different names for what amounts to the same curriculum--e.g., "Transportation" and "Business Logistics" may have essentially the same body of courses. List all curricula in both categories that would help the person at the local college prepare the Planning system displays.

If there is no appropriate curriculum, say "None." If there is no appropriate curriculum but it would be possible to take a few isolated courses, these courses and the department likely to offer them should be mentioned in SPECIAL NOTES below.

Example:

POSSIBLE CURRICULA: English, Speech & Theatre, Speech, Theatre Arts, Dramatic Arts, Drama, Theatre, Speech and Theatre Arts, Drama and Speech, Acting

As colleges add new occupations to their planning systems, the planning system coordinator will record the curricula they select. When curricula have been identified at representative user colleges, research assistants should revise the overview pages. Change the heading, "Possible Curricula" to "Names of Curricula Selected by Other Colleges" and follow the format indicated.

Example:

NAMES OF CURRICULA SELECTED BY OTHER COLLEGES:

CC 1: 1 Drama/Theater/Speech; 2 General Studies

CC 2: 1 Assoc. in Arts & Sciences, Theater Emphasis (2 yrs.); 2 Theater/Drama (4 yrs.)

CC 3: 1 Humanities/Social Science (trans.); 2 Spcl. Theater Arts (nontrans)

CC 4: Drama

CC 5: Theater/Drama (trans)

4-yr: Theatre

4. SPECIAL NOTES

a. Check these sources: materials in folder
college catalogs

b. Directions:

Include such miscellaneous information as:

-- warnings about confusing titles (Food Science not appropriate for Chef/Cook; Food Services not appropriate for Food Technologist)

-- special requirements for transfer or certification in this field

-- note if Associate degree is irrelevant

-- notes about coursework which might be offered for apprenticeship programs

-- suggestions of departments which might offer individual courses useful for the career, even if no major is available.

c. Example:

-- Keypunch Operator

SPECIAL NOTES: Programs in computer technology and data processing are too advanced for this occupation. Secretarial programs generally do not include keypunch courses, and secretarial skills, with the exception of typing, are not used by keypunch operators. Unless your school offers specific training for keypunch operators, make a special display. If a keypunch course is offered at your school, it can be mentioned as part of the special display.

5. ENTRY FOR THE PLANNING SYSTEM INDEX

The last section of the overview page is for use by local colleges. It is a place to record information which will later be incorporated into the index for the college's Planning system.

See Chapter IV for information on distribution of Planning System material (including Overview) to SIGI users.

D. Directions for Securing Occupational Reviews

Since members of the SIGI staff deal with so many occupations with which they have had no personal experience, the practice of submitting SIGI write-ups to occupational reviewers who are knowledgeable in the field has been established. At least two reviewers should read the write-up before it is entered into the computer.

1. Selection of Reviewers:

Staff members of professional associations are preferred reviewers. An information officer or executive secretary whose job it is to disseminate accurate information about the occupation is usually available and happy to have the opportunity to reach students. These people know the national picture rather than just the local situation.

It is best to first contact reviewers by phone to enlist their participation. This is a good time to ask questions about points of information which may be troubling. Answering such questions may also arouse their interest and usually makes them more willing to review the write-up.

2. Sending the Write-Up

The cover letter should briefly explain SIGI even though this may have been done on the phone. (See Exhibit II-23 for a sample letter.)

Both write-up and overview should be enclosed. (If using a computer printout, categories must be labeled.)

Set a deadline for return of the write-up and reviewer's comments.

Provide a stamped return envelope for the reviewer's convenience.

3. Card File and Records

A card file containing names and addresses of reviewers is kept in the card catalog, indexed alphabetically by the name of the occupation.

Use the "Checklist for Adding New Occupations" (Exhibit II-1) and the index card to keep track of correspondence with reviewers.

Example:

Occupational Reviewer   Occup. Title

Name

Association Title

Address

Phone

Sent 1/2/76
Ret'd 2/1/76
Thank you 2/5/76

4. Incorporating Reviewer's Comments

Reviewer's comments cannot always be incorporated into the write-up. In addition to space limitations which a reviewer may not be aware of, there may be matters which we do not as a policy include for any occupation. As a general rule,include the suggestions if possible. Use your general knowledge of the occupation, source materials in the library, comments of the other reviewer, and an estimation of the reliability and special interests of both reviewers to decide whether or not to make changes.

Document all changes on the appropriate doc card, referring to copies of the reviewers' comments filed in the folder for the occupation. Send an acknowledgement to the reviewer. (See Exhibit II-24 for sample Thank-You Letter.)

E. Entering Write-Up in Computer

Prepare an occupational rating sheet recording all values and the classification for the occupation (See Exhibit II-25.) Put this sheet in the proper occupational notebook at the beginning of the section for this occupation.

Follow steps under #4 Entering Into Computer on Checklist for Adding a New Occupation, Exhibit II-1.

CHECKLIST FOR ADDING A NEW OCCUPATION TO SIGI INFORMATION SYSTEM

Occupational Title ____

_____ Initials of researcher assigned. _____ Date research began

1. Research

_____a. Check folders for the proposed occ or "Proposed Occs, General."
_____b. Check folder "Sources of Occupational Information" and write for materials appropriate for this occupation.
_____c. Write to professional associations for information.
_____d. Check Occupational Outlook Handbook.
_____e. Check Dictionary of Occupational Titles.
_____f. Check folder "Basic References."
_____g. Check folder "Salary Surveys, Many Occupations."
_____h. Check ETS Library.
_____i. Log in new materials; be sure bib card is filed before using publication.

2. Write-up

_____a. Complete COMPARE questions and check line counts.
_____b. Complete value ratings and check with at least one other occupational specialist on staff.
_____c. Prepare overview sheet for Planning Manual (Appendix A).
_____d. Enter alternate titles and suboccupations on a cross-reference card.
_____e. Complete documentation.
_____f. File materials in proper location in SIGI Library.

3. Occupational Review

*_____a. Send completed write-up to two reviewers.
#1. Name ______________________________ #2. Name ______________________________
Address ______________________________ Address ______________________________
*_____b. Write-up returned by reviewer
#1. ______________________________ #2. ______________________________
_____c. Add corrections and enter documentation.
#1. ______________________________ #2. ______________________________
*_____d. Send thank you letter to occupational reviewer
#1. ______________________________ #2. ______________________________
_____e. Make 3 x 5 card for file on occupational reviewers. Include address and dates of above.

4. Entering Into Computer

*_____a. Send write-up and overview to computer operator for entry on update disk.
_____b. ID # (three digits) assigned by computer operator.
_____c. When printout is returned, proofread and place in proper notebook. Check value ratings carefully.
_____d. File in folder a copy of write-up as sent to computer operator (contains some information not on printout).
_____e. Add name of new occupation to two lists:
    1. List of occupations to be added to Planning System.
    2. List of new occupations being stored on unmailed update disk.
_____f. File checklist in folder with write-up.

* Enter date of completion of these activities.

EXHIBIT II-2

SAMPLE LETTER REQUESTING INFORMATION

EDUCATIONAL TESTING SERVICE PRINCETON, N. J. 08540

Area Code 609
921 - 9000
CABLE-EDUCTESTSVC
•
Developmental Research Division

Our research group has developed the computer-based System of Interactive Guidance and Information (SIGI) which assists college students in making their career plans. One of the occupations we are adding to our system is

I would like your help in obtaining information about this occupation. In addition to a general definition and description of the occupation, we need to know the following:

- beginning, median, and top income (nationwide)
- educational and licensing requirements
- fringe benefits
- security
- opportunities for advancement
- special problems
- outlook for the future
- opportunities for leadership, independence, variety, and helping others
- percent women in the occupation.

Any information you can provide about these areas or others will be most appreciated. Leads on other sources of information would be extremely useful.

Please call us if you have questions about our request or the project in general. Thank you for your cooperation.

Sincerely,

EXHIBIT II-3

SAMPLE LETTER REQUESTING WAIVER OF FEE

EDUCATIONAL TESTING SERVICE **PRINCETON, N.J. 08540**

Area Code 609
921-9000
CABLE-EDUCTESTSVC
•
Developmental Research Division

January 31, 1974

Ms. Margarite Kent
American Marketing Association
222 S. Riverside Plaza
Chicago, IL 60606

Dear Ms. Kent:

We so appreciated your help over the telephone when we were seeking information for Market Researcher. We have received the survey you mailed us.

We would like you to consider the elimination of the fee of eleven dollars ($11) charged for our copy (Invoice No. 7217). Educational Testing Service is a non-profit research organization and our specific project in vocational guidance is designed especially to interest and inform young people about careers. In your case, the information you provided goes into use by students considering a career in Market Research. Therefore, while you have graciously provided us a service, we would like to receive the survey information free of charge since we provide a service to young people attracted to the career field represented by your organization.

We are, of course, prepared to pay the amount if our request is denied. We look forward to hearing from you on this matter.

Sincerely,

Gretchen W. Bullock

Gretchen W. Bullock
Senior Research Assistant

GWB:mb

EXHIBIT II-4

HOW TO USE THE DOT IN PREPARING NEW OCCUPATIONAL WRITE-UPS

The DOT is useful in finding information for answers to 11 of the 28 questions in COMPARE. It is recommended that the DOT be consulted as one of the first steps in doing occupational research. Notes should be taken, following the steps below, to collect information on all 11 questions. These notes, rather than the DOT itself, can be used later in conjunction with other materials in constructing answers to the questions. Note page numbers for use in documentation.

The DOT is in two volumes with two supplements. Volume I lists occupations in alphabetical order, giving a short description of the activities involved. Volume II lists occupations by Worker Trait Groups and includes information about aptitudes, interests, temperaments, and physical demands.

The following is a step-by-step procedure for using the DOT:

1. Look up the occupational title in Volume I. Occupations are listed in alphabetical order. Take notes on parts of the definition which would be useful in writing up Definition and Description.

2. Note the DOT number(s) appearing after the occupational title(s) in Volume I. Occupations, such as lawyer, which have many specialties have more than one number. Use the number(s) to help answer the question on Data/People/Things as described elsewhere in this handbook (Chapter II, Section IV-3).

3. Look up the number of the occupation in the first column of the 1966 Supplement. The second column gives the page number in Volume II for the Worker Trait Group to which the occupation has been assigned. Locate the page and scan the information on the page for possible use in answering SIGI questions. "Work Performed" may relate to Definition and Description. "Worker Requirements" and "Clues for Relating Applicants and Requirements" relate to Personal Qualifications and Other Requirements. "Training and Methods of Entry" may be out of date, but can be read as background material.

4. Look at the "Qualifications Profile" at the bottom of the same page in Volume II. A typical profile looks like this:

QUALIFICATIONS PROFILE

GED: 5 6
SVP: 7 8

Apt:	GVN	SPQ	KFM	EC
	112	122	222	53
	21	21		

Int: 7 4 5
Temp: 9 0 5
Phys. Dem: S L 4 5 6

EXHIBIT II-4 (cont.)

5. Disregard the first two categories, "GED" and "SVP."

6. The third category, Aptitude, lists codes for aptitudes required for the occupation. Refer to the section on Aptitudes, Volume II, Appendix B, p. 653. Read the explanation of the code. Decode the information under Aptitudes in the Qualifications Profile. This information is most useful for Personal Qualifications and Other Requirements.

7. The fourth category in the Qualifications Profile, Interests, refers to five pairs of interest factors which may be associated with the occupation. Read the section on Interests in Appendix B, p. 654. Decode the information which may be useful for Helping Others, Interest Field, and Variety.

8. The fifth category in the Qualifications Profile, Temperaments, covers occupational situations to which workers must adjust. Read the section on Temperaments in Appendix B, p. 654. Decode the information which may be useful for Leadership, Independence, and Variety.

9. The sixth category in the Qualifications Profile, Physical Demands, lists physical activities required in the occupation. Read the section on Physical Demands in Appendix B, pp. 654-655. Decode the information which may be useful for Special Problems.

EXHIBIT II-5

RATING CATEGORIES AND THESAURUS FOR DATA/PEOPLE/THINGS

(SIGI Amendment to Ovis Article)

	Data*	People*	Things*
High	0 Synthesizing 1 Coordinating 2 Analyzing Adapt Apply principles Arbitrate Calculate Classify Decide Design Develop ideas Diagnose Discuss ideas Do research Enforce standards Estimate Evaluate Explain Forecast trends Integrate Interpret Investigate Make policy Organize Originate Plan Predict Solve problems Study Survey Translate ideas into artistic performance Translate ideas into practical application Write reports, directions, or specifications	0 Mentoring 1 Negotiating 2 Instructing 3 Supervising 4 Diverting 5 Persuading Advise Consult Counsel Cure Direct Employ Entertain Evaluate people Help Influence Is responsible for Lead Modify behavior Order Prescribe Rate Rehabilitate Remedy Resolve disputes Stimulate Test	0 Setting-up 1 Precision working 2 Operating-controlling 3 Driving-operating Build Calibrate Construct Create Design Draft (detailed sketches) Experiment Fabricate Identify Invent Make Trouble shoot Use precision equipment
Medium	3 Compiling 4 Computing 5 Copying 6 Comparing Apply information Assist in research Carry out instructions Check Collect facts, information, data Edit File reports Follow diagrams Handle applications Keep files Keep log Memorize Record Record observations/transactions Review Supply information Transcribe Use maintenance manual Verify	6 Speaking-signaling 7 Serving Answer inquiries Assist Confer Correspond with Examine people or animals Follow up Inform Interview Notify Observe Participate in team effort Protect Refer Represent employer Rescue Serve the buying public Treat (minor) Visit Greet Guard	4 Manipulating 5 Tending 6 Feeding-offbearing 7 Handling** Adjust Arrange Assemble Carry Combine Cultivate Drive Examine equipment Inspect Install (routine) Maintain Modify Monitor equipment Overhaul Purchase equipment Regulate Repair Replace Sell Test equip. Type Use tools or equip.
Low	7 & 8 No significant relationship Not related to work activities	8 No significant relationship Little direct interaction with people as part of work activity May supervise a few technicians/assistants/work men	8 No significant relationship Not related to work activity Must be familiar with and handle equipment, but does not operate it.***

---

* Numbered words are taken from the Dictionary of Occupational Titles, App. A, Vol. II, p.649

** "Handling," used for "Things: medium," refers to handling machines.

*** "Handle," used for "Things: low," refers to handling tools or instruments (e.g., Oper Rm Tech)

EXHIBIT II-6

DEFINITION AND RATING CATEGORIES FOR EARLY ENTRY

Definition of Value

EARLY ENTRY: You can enter some occupations with very little education or training. Other occupations require years of expensive education. (The cost includes loss of income from a job you might have if you were not in school.) Think about the time (and money) you are willing to spend on education. Also think about your attitude toward school: Is education a satisfying experience? Or does it seem like a drag?

Definition of Category

Rating

4 Only one year or less of preparation beyond high school required to enter occupation or begin apprenticeship; classified TERM (e.g., library technician, machinist).

3 No more than 2 or 3 years of preparation beyond high school required; classified TERM, or SHUD if bachelor's degree is recommended (e.g., TERM - legal assistant; SHUD - insurance agent).

2 No more than 4 years beyond high school required (bachelor's degree required); classified BACH, or GRAD if many workers in the occupation get graduate education (e.g., BACH - teacher, physical therapist; GRAD - social worker, clergy).

1 Entry after 5 or more years of preparation beyond high school required for all practical purposes; classified PROF (e.g., pharmacist, school counselor, lawyer, mathematician).

NOTE: For the Planning system, a 1-to-6 classification is used, which fits into the rating system as follows:

	Classification	Rating
PROF	1	1
GRAD	2	2
BACH	3	2
SHUD	4	3
WICH	5	2 or 3
TERM	6	3 or 4

Ratings are designed to make the occupation appear in LOCATE and to determine desirability sums in STRATEGY. They are based on the minimum amount of education needed for employment in the occupation. The classifications SHUD and GRAD call up displays which tell the student that more than the minimum amount of education is available and may be desirable.

Revised 6/76

EXHIBIT II-7

DEFINITION AND RATING CATEGORIES FOR INCOME

Definition of Value

HIGH INCOME: Some minimum income (enough for survival) is essential for everyone. But beyond that, how important to you are the extras? People have different ideas about how much income is "high." Therefore, HIGH INCOME is not defined here as a specific amount. It means more than enough to live on. It means money to use as you wish after you have paid your basic living expenses. You can buy luxuries and travel first-class.

Definition of Category

Rating	
5	Median income of $20,000 or more.
4	Median income of $15,000-$19,999.
3	Median income of $11,000-$14,999.
2	Median income of $8,000-$10,999.
1	Median income of $7,999 or less.

NOTE: The definitions of these categories are reviewed annually because of rapid changes in salaries.

(See guidelines on following page)

Revised 4/76

EXHIBIT II-7 (cont.)

GUIDELINES FOR ASSIGNING SALARY RATINGS

It is sometimes difficult to assign a median income rating to an occupation such as model and fine artist because:

(a) No formal surveys have been done.
(b) Salaries vary so widely that median figure may be useless.
(c) Two occupations may be grouped together (such as singer/singing teacher) only one of which (singing teacher) has been surveyed.
(d) Work may be done on free-lance basis, so that annual earnings depend on number of hours worked or projects completed, plus the rate of pay.

Occupations which are particularly difficult to rate on this dimension are:

- Actor/Actress
- Dancer/Dancing Teacher
- Musician
- Singer/Singing Teacher
- Model
- Fine Artist/Private Art Teacher

As a general rule, assign the highest reasonable rating so the occupation will appear in LOCATE. Let the explanation qualify the rating. For example, if the salary for Music Teacher has a rating of 2, use this as the overall rating, but qualify it by distinguishing between types of music teachers and professional musicians in the write-up.

Do not include in calculations people who are unemployed, but are qualified for the occupation. Do take into account people who are in the occupation but who have extremely low income. Facts about unemployment and low income should be included in sections on Outlook, Security, and Salary Variability.

EXHIBIT II-8

DEFINITION AND RATING CATEGORIES FOR HELPING OTHERS

Definition of Value

HELPING OTHERS: Most people are willing to help others, and show it every day outside of their work. They put themselves out to do favors, make gifts, donate to charities, and so on. THIS DOES NOT COUNT HERE. The question here is, Do you want HELPING OTHERS to be a main part of your occupation? To what extent do you want to devote your life work directly to helping people improve their health, education, or welfare?

There are two elements involved in helping others for the purpose of rating this value: (1) the presence of face-to-face contact with the people being helped, and (2) the level of help being offered as measured by impact on health, education, or welfare. In classifying occupations on this dimension, the primary function of the occupation should be considered rather than the motivation of workers in the occupation. For example, even though some architects may be motivated to improve the appearance of the environment, such is not the primary function of the occupation, per se. We would rate soil conservationist higher than architect on this dimension because the primary function of the former occupation is to improve the environment, regardless of the motivation of workers in the occupation. Some occupations associated with academic disciplines (e.g., physicist and economist) would seem to provide an indirect service which vitally influences health, education, or welfare. However, there is a distinction between seeking knowledge and providing a service. Knowledge is not serviceable until it is applied. Therefore, the primary function of these occupations is not to vitally influence health, education, or welfare, even though the new knowledge they provide may eventually produce change.

Definition of Category

Rating	
4	A great amount: Working with people directly to vitally improve or maintain their health, education, or welfare (e.g., clergy, teacher, physician).
3	A more than average amount: (a) Providing an indirect service in the legal, social, scientific, or environmental fields that vitally influences the health, education, or welfare of the general public (e.g., hospital administrator, labor relations specialist, medical record administrator, soil conservationist); or (b) having meaningful, but not vital influence on individual clients in improvement or maintenance of their health, education, or welfare (e.g., nursing assistant, recreation worker, dental hygienist).
2	An average amount: Having considerable face-to-face contact with the public to provide a service that makes life more convenient or pleasant for specific segments of the public (e.g., actor/actress, landscape architect, beautician).
1	A less than average amount: Having little or no face-to-face contact with the public. Does not provide services directly to the public or directly to influence the health, education, or welfare of the general public (e.g., physicist, economist, oceanographer, typist, civil engineer).

EXHIBIT II-9

DEFINITION AND RATING CATEGORIES FOR LEADERSHIP

Definition of Value

LEADERSHIP: Do you want to guide others, tell them what to do, be responsible for their performance? People who weight LEADERSHIP high usually want power to control events. They want to influence people to work together effectively. If they are mature, they know that RESPONSIBILITY goes with LEADERSHIP. They are willing to accept the blame when things go wrong, even though they were not at fault.

The amount of leadership is judged on two factors: (1) the number of coworkers one directs and is responsible for, and (2) the number of clients influenced and the importance and duration of the activity.

Definition of Category

Rating	
4	A great amount: (1) Directs many coworkers and is responsible for their performance or (2) exerts influence over many clients in areas of activity that are important and of long duration (e.g., teacher, hospital administrator, psychologist).
3	A more than average amount: (1) Directs a moderate number of coworkers and is responsible for their performance or (2) exerts influence over clients in areas of activity that are of moderate importance and/or moderate duration (e.g., correction officer, recreation worker, registered nurse, retail store manager).
2	An average amount: (1) Directs a few coworkers and is responsible for their performance or (2) exerts influence over clients in areas of activity that are of minor importance or duration (e.g., oceanographer, dancer/dancing teacher, legal assistant).
1	A less than average amount: No opportunity to direct others. Not responsible for the performance of others (e.g., bank teller, computer operator).

Revised 4/76

EXHIBIT II-10

DEFINITION AND RATING CATEGORIES FOR THE SIX INTEREST FIELDS

Definition of Value

FIELD OF INTEREST: Some people have only one main field of interest (Scientific, Technological, Administrative, Personal Contact, Verbal, or Aesthetic); others are interested in two or more of these fields. Some insist that their occupation must be in one of their major FIELDS OF INTEREST. Others are willing to work in a field that is less interesting; they feel they can satisfy their main interests in their spare time.

Definition of Six Interest Fields

*(1) SCIENTIFIC--data, knowledge, observations, analysis, mathematics.
Examples: physicist, botanist, engineer, economist.

*(2) TECHNOLOGICAL--things, machines, manipulative and mechanical skills.
Examples: toolmaker, mechanic, technician.

(3) ADMINISTRATIVE--business, finance, records, systems.
Examples: accountant, secretary, bank teller.

(4) PERSONAL CONTACT--people, selling, supervising, persuading, teaching.
Examples: salesman, social worker, stewardess, teacher.

(5) VERBAL--words, reading, writing, talking, listening.
Examples: journalist, teacher, advertising copywriter.

(6) AESTHETIC--art, painting, sculpture, design, music, dance.
Examples: artist, interior designer, musician, architect, TV producer /director.

All occupations are rated on all six fields. The rating for each field is determined by an analysis of job activities.

---

* Note that when assigning an interest field to an occupation which does not seem to be clearly scientific or technological, occupations involving the theoretical would be considered scientific, while the more practical occupations would be considered technological (e.g., botanist = scientific; nurseryman = technological). Furthermore, technological may include not only mechanical interests, but also such manipulative activities as those of a cook, draftsman, or nurseryman.

(See definitions of categories on next page.)

Revised 4/76

EXHIBIT II-12

DEFINITION AND RATING CATEGORIES FOR LEISURE

Definition of Value

LEISURE: How important is the amount of time your occupation will allow you to spend away from work? LEISURE may include short hours, long vacations or the chance to choose your own time off. To give a high weight to LEISURE is like saying, "The satisfactions I get off the job are so important to me that work must not interfere with them."

Three considerations are involved in this definition: (1) amount of time spent in work (e.g., length of work week, length of vacations); (2) irregularities in the work schedule (e.g., shift work, overtime, weekend work); and (3) control over one's work schedule (e.g., 4-day week with longer work day, control over time of arrival and departure, work at home).

Definition of Category

Rating		
4	A more than average amount: Does not normally work more than 40 hours per week, with some control over work schedule, and has more than three weeks' annual vacation, if desired (e.g., teacher, fine artist/art teacher, model, flight attendant).	40 hrs. + control + vacation
3	An average amount: Approximately 40 hours of work per week, free from irregularities (e.g., legal assistant, receptionist, industrial engineer).	40 hrs. + no irreg.
2	A less than average amount: Approximately 40 hours of work per week with some irregularities such as night or evening work, occasional overtime, or work on weekends (e.g., practical nurse, oceanographer, newspaper reporter).	40 hrs. + some irreg.
1	A small amount: A longer than 40-hour work week in which overtime (voluntary or mandatory) or other irregularities occur frequently (e.g., labor relations specialist, clergy, physician).	more than 40 hrs. + frequent irreg.

NOTE: The verbal "tags" for the scale ratings for Leisure differ from the other values dimensions, because deviations above the "average" and modal work week are too infrequent to warrant two higher scale steps. It was possible, however, to identify two lower scale steps that differentiated a significant number of occupations. In other words, relatively few occupations offer "more" leisure than the modal amount; a substantial number offer "less."

Revised 5/76

EXHIBIT II-13

DEFINITION AND RATING CATEGORIES FOR INDEPENDENCE

Definition of Value

INDEPENDENCE: Some occupations give you more freedom than others to make your own decisions, to work without supervision or direction from others. At one extreme might be talented free-lance artists or writers who may work without supervision. At the other extreme might be military service or some big business organizations with chains of command which severely limit the decisions that each person can make.

The four categories correspond to different frequencies of evaluation and supervision.

Rating	Definition of Category
4	A great amount (Rare supervision): Responsible to someone else only in extraordinary circumstances. Self-employed or top management level or professional (doctorate highly recommended). Decides what work needs to be done or shares in setting overall objectives. Seldom reports to superiors (e.g., psychologist, farm manager, geographer).
3	A more than average amount (Occasional supervision): Exercises independence within a framework established by top management. Generally not self-employed. Quality of work is evaluated at long intervals (e.g., secondary school teacher, social worker, production manager).
2	An average amount (Weekly or monthly supervision): Works closely with supervisor or under supervisor who assigns work regularly. Free to decide priorities and details of assigned work (e.g., physician's assistant, police officer, registered nurse).
1	A less than average amount (Daily supervision or unsupervised routine): Most activities are directly supervised or routinized, with little opportunity to act independently (e.g., nursing assistant, receptionist, bank teller).

EXHIBIT II-14

DEFINITION AND RATING CATEGORIES FOR VARIETY

Definition of Value

VARIETY: Occupations with the greatest VARIETY offer many different kinds of activities and problems, frequent changes in location, new people to meet. VARIETY is the opposite of routine, predictability, or repetition. If you value VARIETY high, you probably like novelty and surprise, and enjoy facing new problems, events, places, and people.

Definition of Category

Rating	
4	A great amount: Substantial variety in problems and in either place or people (e.g., teacher, psychologist).
3	A more than average amount: Either a substantial variety in problems (but not in place or people); or a moderate variety in problems and in either place or people (e.g., real estate agent, aerospace engineer).
2	An average amount: Either a moderate variety in problems (but not in place or people); or little variety in problems with considerable variety in people or place (e.g., pharmacist, model).
1	A less than average amount: Very little meaningful variety in problems, place, or people. Tasks generally repetitive or routine (e.g., typist, library technician).

EXHIBIT II-15

DEFINITION AND RATING CATEGORIES FOR SECURITY

Definition of Value

SECURITY: In the most SECURE occupations, you will be free from fear of losing your job and income. You will have tenure--that is, you cannot be fired very easily. Employment will tend to remain high in spite of recessions, and there will be no seasonal ups and downs. Your income will generally remain stable and predictable; it will not vanish with hard times. Your occupation is not likely to be wiped out by automation or other technological changes.

There are three aspects of Security to consider: (1) Are there guarantees of employment? (2) What is the supply of qualified workers? and (3) How sensitive are jobs to economic fluctuations or technological innovations? The four categories of Security combine these three elements.

Definition of Category

Rating	
4	A great amount: Some guarantee of employment and income, such as tenure or union contract provisions (e.g., teacher, police officer, welder), or shortage of qualified personnel in a profession where many are self-employed (e.g., dentist, physician).
3	A more than average amount: Shortage of qualified workers in the field *or* not sensitive to fluctuations in the economy or technological obsolescence--i.e., good outlook (e.g., physician's assistant, geologist, beautician).
2	An average amount: Average labor supply and mildly sensitive to fluctuations in the economy or technological change (e.g., social worker, florist, personnel interviewer).
1	A less than average amount: Keen competition for most job openings *or* strong dependence on economic conditions *or* risky income, such as from commissions, or highly susceptible to technological obsolescence (e.g., actor/actress, interpreter/translator, real estate agent).

Revised [illegible]/76

EXHIBIT II-16

STYLE RULES FOR OVERVIEW

1. Avoid subjectless sentences. Use "you" or imperative. (For other general style notes, see Appendix E.)

2. Wherever manpower development training opportunities are mentioned, say instead, "Check your state employment service for possible government-sponsored training programs."

3. Step 2 for PROF, GRAD, BACH, 4-YEAR WICH:

   "If you start in a community college, select a 4-year college that offers a program in   . Take courses required for transfer."

4. Step 2 for TERM:

   "Make sure you fulfill the course requirements for the Associate degree."

   This sentence should be used only when a specific vocational program is offered by the community college. If the Associate degree is not directly related to the occupation, do not mention it.

5. Step 2 for SHUD:

   "If you start at a community college, take ____________________.* If you wish to transfer,** select a 4-year college with a program in ________________. Take courses required for transfer.

   ---

   *say here, "Programs listed in step 1" or, if possible, list the program(s).

   **insert other programs here, if necessary.

---

6. For Step 2 where program at 4-year college has different name from that at 2-year college, write "Continue as in Step 1," when space allows.

7. Step 3 for SHUD:

   "Get degree. Bachelor's degree is highly recommended..." (or words to that effect.)

8. Refer to summer work experience before saying, "get degree."

9. Include as a final step any requirements or recommendations for updating skills (as for optometrists, physicians, teachers, etc.) Do not refer to "continuing education" but rather to updating skills.

EXHIBIT II-17

SAMPLE PROF OVERVIEW

241 GEOLOGIST PROF

To become a geologist you must have a bachelor's degree in geology, chemistry, 78
or physics and a master's degree in geology. For best preparation, you should: 79

1. Enroll in either geology, chemistry, or physics in college. 63

2. If you start at a community college, select a 4-year college with a bache- 78
   lor's program in geology, chemistry, or physics. Take courses required 75
   for transfer. 17

3. Get a bachelor's degree in geology, chemistry, or physics. Apply for ad- 77
   mission to a graduate program in geology. 45

4. Complete the master's and/or Ph.D. degree in geology; Ph.D. required for 77
   university teaching and research. 33

For a copy press PRINT; otherwise press NEXT. 45

EXHIBIT II-18

SAMPLE GRAD OVERVIEW

136 ELECTRICAL/ELECTRONICS ENGINEER GRAD

1. Enroll in electrical engineering in college. 47

2. If you start at a community college, select a 4-year college with a 70
   bachelor's program in electrical engineering. Take courses required for 74
   transfer. 12

3. Get bachelor's degree. (In some colleges this may require a fifth year of 76
   study.) 9

4. Check licensing or registration requirements in the state where you wish to 78
   work. You may be required to pass an examination. NOTE: Take exam as early 77
   as possible in your career, while your formal training is still fresh; you 77
   may need registration eventually. You may be able to take the first part of 78
   the exam in your senior year. 32

5. Beginning research and college teaching positions require a master's or doctor's 74
   degree. Graduate study in electrical engineering improves chances for ad- 70
   vancement. 10

For a copy press PRINT; otherwise press NEXT. 45
20

EXHIBIT II-19

SAMPLE BACH OVERVIEW

118 BANK OFFICER BACH

1. Enroll in banking, finance, or business administration in college. 69

2. If you start at a community college, enroll in business administration. Select a 76
4-year college that offers one of the programs named in step 1. Take the courses 77
required for transfer.* 33

3. While in college try to participate in summer training programs which may 76
be offered by large city banks in your area. 47

4. Get bachelor's degree. 25

5. When hired by a bank, you will probably have to complete its management 74
training program which will train you in many aspects of banking. After 74
completing this training (usually 6 months to 2 years), you will be placed 77
in a management position. 28

6. You need years of experience and advancement to become a top officer. 72

For a copy press PRINT; otherwise press NEXT. 45

* If community colleges do not have specific programs to prepare for an occupation, you may use the following format:

> 2. If you start at a community college, select a 4-year college with a bachelor's program in physical therapy, biology, or psychology. Plan a program (including courses, such as biology, physical sciences, and psychology) which meets the transfer requirements of that college.

EXHIBIT II-20

SAMPLE SHUD OVERVIEW

104 ACCOUNTANT SHUD

1. Enroll in accounting in college. 35

2. If you start at a community college, enroll in accounting. If you wish to 76
transfer, select a 4-year college with a bachelor's program in accounting. 77
Take courses required for transfer. 38

3. Get degree. Bachelor's degree is very strongly recommended. You can get 74
jobs with less, but at least half the states have laws requiring certified 77
public accountants to have a bachelor's, and in recent years nearly 9 out 76
of 10 who passed the CPA exam were graduates of 4-year colleges. 67

4. Best positions go to those who are certified public accountants. To quali- 77
fy, you must pass exam given by American Institute of Certified Public Ac- 77
countants; also, in most states you must have at least two year's experi- 76
ence to be certified. 24

For a copy press PRINT; otherwise press NEXT. 45

EXHIBIT II-21

SAMPLE TERM OVERVIEWS

233 KEYPUNCH OPERATOR TERM

You do not have to go to college to become a keypunch operator. Better jobs are 79
easier to get if you have excellent typing skills. For best preparation, you 76
should: 7

1. Check business and data processing schools in your area to see if they of- 78
   fer training in keypunch operation. Enroll in that program. (Some com- 75
   munity colleges also offer courses in keypunching.) 55

2. Some employers offer on-the-job training which you can take instead of a 76
   business school program. Most employers offer on-the-job training for 73
   trained keypunch operators lasting from 3 days to 1 week. 61

For a copy press PRINT; otherwise press NEXT. 45

150 INDUSTRIAL TRAFFIC MANAGER TERM (Use two-plan format when there are two distinct options.)

Two years of college are very desirable and often required. Many employers 74
require a bachelor's degree as well. To prepare, follow either of the plans 75
below. Plan I, two years of college: 36

1. Enroll in marketing distribution program at community college. 65

2. Complete Associate degree. 29

Plan II, four years of college: 31

1. Enroll in transportation and distribution management or business logistics. 78

2. If you start in a community college, enroll in business administration. 74
   Select a 4-year college with a degree in transportation and distribution 75
   management or business logistics. Take courses required for transfer.* 72

3. Get bachelor's degree. If you want professional status, you can become a 75
   certified member of the American Society of Traffic and Transportation by 76
   taking exams and meeting education and experience requirements. 66

For a copy press PRINT; otherwise press NEXT. 45

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* See footnote, page 89.

EXHIBIT II-21 (cont.)

133 DIESEL MECHANIC TERM

For best preparation, you should:

1. Take diesel mechanics (sometimes called automotive and diesel technology or 78
   diesel technology) in community college. 43

2. Get Associate degree or certificate. 39

If you don't enroll in community college, follow either A, B, or C: 67

A. Enroll in a technical institute or trade school offering a 2-year program 76
or practical experience and classroom instruction. You will probably also 76
need on-the-job training after graduation. 45

B. Complete a formal 4-year apprenticeship program in diesel mechanics. 71

C. Some employers offer on-the-job training which you can take instead of a 75
formal program. 18

NOTE: Some instruction may be accepted by certain 4-year colleges for credit 76
toward a bachelor's degree in diesel technology. 48

For a copy press PRINT; otherwise press NEXT. 45

245 EEG TECHNOLOGIST TERM

No college work is required, but a 6-month to 2-year on-the-job training program 77
must be completed. Most are given at hospitals or medical schools with 76
an EEG department. A few colleges also offer programs. For best preparation: 76

1. Obtain from the American Society of EEG Technologists a list of places where 79
   formal or informal training is available. (List is updated annually.) 73

2. Select a program near you and apply for admission. 53

3. After completing the training program, obtain an additional year of experience. 74
   12

4. Pass the registration exam of the American Board of Registered EEG Technologists 79
   to increase chances for advancement and higher salary. 63

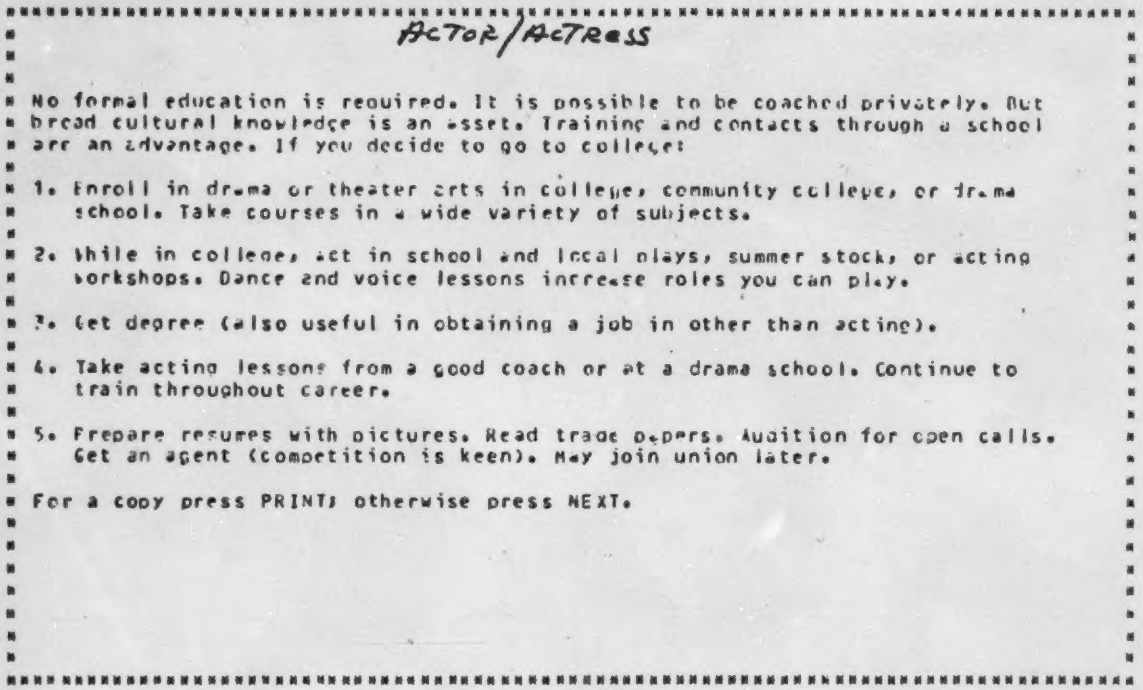
NOTE: If you decide to go to college before entering an EEG training program, 77
take courses related to the occupation such as math, science, health technology, 76
or electronics. After obtaining your degree, follow the steps outlined 77
above.

For a copy press PRINT; otherwise press NEXT. 45

SAMPLE OVERVIEW PAGE

EXHIBIT II-22

NAME & NO. OF OCC.: 101 Actor/Actress CLASS.: SHUD



ACTOR/ACTRESS

```
No formal education is required. It is possible to be coached privately. But
broad cultural knowledge is an asset. Training and contacts through a school
are an advantage. If you decide to go to college:

1. Enroll in drama or theater arts in college, community college, or drama
   school. Take courses in a wide variety of subjects.

2. While in college, act in school and local plays, summer stock, or acting
   workshops. Dance and voice lessons increase roles you can play.

3. Get degree (also useful in obtaining a job in other than acting).

4. Take acting lessons from a good coach or at a drama school. Continue to
   train throughout career.

5. Prepare resumes with pictures. Read trade papers. Audition for open calls.
   Get an agent (competition is keen). May join union later.

For a copy press PRINT; otherwise press NEXT.
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NAMES OF CURRICULA SELECTED BY OTHER COLLEGES

CC 1: 1 Drama/Theater/Speech; 2 General Studies

CC 2: 1 Assoc. in Arts & Sciences, Theater Emphasis (2 yr.); 2 Theater/Drama (4 yr.)

CC 3: 1 Humanities/Social Science (trans); 2 Spcl Theater Arts (nontrans)

CC 4: Drama

CC 5: Theater/Drama (trans)

4-yr: Theatre

SPECIAL NOTES

Curriculum name	Spcl. no.	Prereq. no.	Prog. no.	Coll. no.
1.				
2.				
3.				
4.				
5.				
6.				
7.				

EXHIBIT II-23

SAMPLE LETTER REQUESTING OCCUPATIONAL REVIEW

Date

INSIDE ADDRESS

Dear ____________________________:

This is the information we spoke to you about over the phone. Our career descriptions are part of the computer-based System of Interactive Guidance and Information (SIGI) which is used by college students in career decision-making.

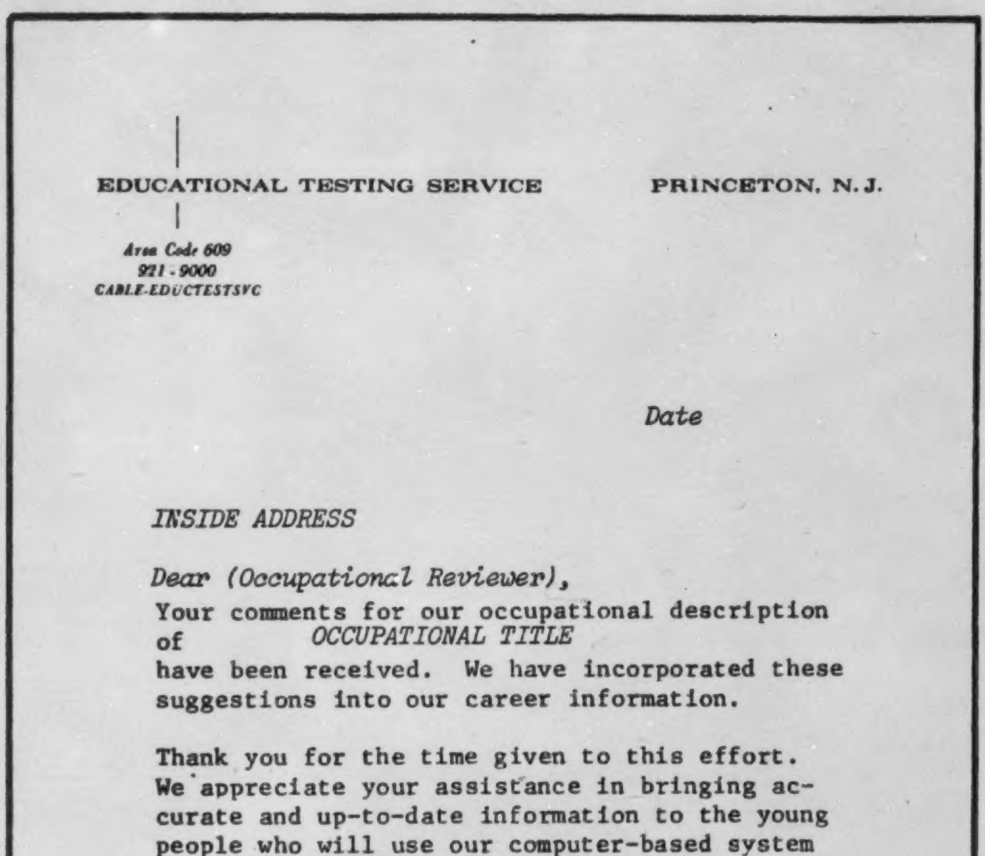
The statements are brief because they are stored in a computer memory. Furthermore, the language is simple so that students of all abilities may use the system with ease. Information is designed to apply nationally; local information may vary from what is included in the write-up.

Thank you for taking the time to assist us with this. An envelope is provided in which you can return the copy with your comments and suggestions. Our deadline is

Encl.

EXHIBIT II-24

SAMPLE THANK YOU LETTER TO REVIEWER



EDUCATIONAL TESTING SERVICE **PRINCETON, N.J.**

Area Code 609
921-9000
CABLE-EDUCTESTSVC

Date

INSIDE ADDRESS

Dear (Occupational Reviewer),

Your comments for our occupational description of *OCCUPATIONAL TITLE* have been received. We have incorporated these suggestions into our career information.

Thank you for the time given to this effort. We appreciate your assistance in bringing accurate and up-to-date information to the young people who will use our computer-based system of occupational guidance (SIGI).

We will likely be speaking with you again. Until then, thank you for your help.

Respectfully,

Karen M. Boyle

Karen M. Boyle

Gretchen W. Bullock

Gretchen W. Bullock

mb

EXHIBIT II-25

OCCUPATIONAL RATINGS SHEET

Name of Occupation: ______________________________

SIGI Number: ______________________________

Date: ______________________________

VALUES

— Income

— Prestige

— Independence

— Help Others

— Security

— Variety

— Leadership

Interest Field

Field ____

____ Rating

Field ____

____ Rating

Field ____

____ Rating

— Leisure

— Education

____ Classification

Comments:

Reviewer: ______________________________________

Chapter III

UPDATING THE OCCUPATIONAL BASE

Research on occupations is never complete. No matter how carefully a write-up has been prepared and researched, within one or two years the information must be checked again. The following schedule has been designed to insure that new information is quickly incorporated into the system or to corroborate that the information there is still correct.

Review annually: Salary
(in fall)
  Beginning
  Average
  Top
  Variability

Review every two years: Overall review (all COMPARE questions and overview for all occupations), with particular emphasis on:
(when new edition of OOH is rec'd)
  Outlook and Security
  % Women
  Licensing and Certification Requirements
  Reference

Review as needed: Occupations for which new information is received.

I. General Procedure for Making Revisions

When revising occupational information, one must be careful to take many factors into account. Follow the procedures below carefully to avoid inconsistencies and confusion:

A. Changing Statements in Text

1. Make sure the total character count for the frame has not been exceeded.

   To compute the count for making changes, look for the total count for the frame at the bottom of the printout page. Subtract this number from 1022. This will give you the number of characters which may still be added. In addition, if any words are to be removed, an equal number of characters may be put back. Type out the words to be added and compute the count. Sometimes if an addition is very important, it is possible to check other items on the frame to see if any words or characters could be omitted from them to make room for the new material.

2. Change and date documentation card. This will show the next reviewer the last time anyone worked with the material.

3. Write changes and send to computer operator. Alter value ratings, if necessary. Note rating changes on "Occupational Ratings Sheet" (Exhibit II-25) and the summary printouts which list occupations by value ratings.

   a. Attach a copy of changes to printouts in notebook.

b. When revised computer printouts arrive, proof them carefully and insert them in notebooks, discarding outdated copy. Check new ratings on revised rating printout which will be returned with the revised frames.

B. Changing Overview or Other Items on the Overview Page for Planning Manual

1. Overview

Changes in the Overview are made in the same way as other changes in the text. See Chapter IV, Section I-A for information on incorporating the Overview into the Overview page for the Planning Manual which is distributed to SIGI users.

2. Classification, Possible Curricula or Names of Curricula Suggested by Other Colleges, Special Notes, Entry for the Planning System Index

This information is not in the computer, so changes are not sent to the computer operator. Chapter IV gives the procedures for getting these changes to SIGI users.

3. Occupational Title

When a title is changed, it must be changed in all of the following places:

a. File cards--doc cards, bib cards, cross-reference cards
b. File folder--leave a folder with the old title in the file which refers user to new file.
c. Disk--notify computer operator

Chapter IV, Section I-B gives procedures for notifying SIGI users of a change in title.

II. Annual Salary Review

August is the best time to begin the annual salary update because many surveys are published in the fall from data collections based on the fiscal year starting July 1. The salary review process usually takes two to three months to complete; thus new salary information should be ready just in time for the updated disks which are sent out in January.

Figures more than two years old must be updated so that salary figures will be comparable and current for all occupations. In addition, all occupations for which there are any new data should be updated.

A. Collection of Materials

1. New salary information materials are collected all during the year and reminder cards are filed by occupation in the drawer for "Unread Material."

2. In addition, at the beginning of a Salary Review, the following materials should be collected:

    a. Copies of surveys which need to be updated. Find these through:

        -- subject folder "Salary Surveys, Many Occupations..."
        -- subject cards for "Salary Surveys, Many Occupations..." (to track down oversized materials filed elsewhere)
        -- card file "Sources of Salary Information" lists publishers of surveys, update cycles, & costs.

    b. Recent editions of surveys listed in Salaries of Scientists, Engineers and Technicians published by Scientific Manpower Commission, if they would be the best source for one or more SIGI occupations.

    c. An August issue of Employment and Earnings from the ETS Library to check figures for general classifications.

    d. An updated PATCO report on Civil Service classifications.

    e. Check tickler files and "On Order" cards.

B. Preliminary Procedures

1. Check income rating categories to see if they should be revised upwards because of inflation. Before making any changes in ratings, consult other staff members, and obtain approval of Mr. Katz.

2. Identify occupations with salary data which are more than two years old. Make notes to review these occupations first.

3. Check "Unread Material $" cards. Make notes to review all occupations for which we have new material.

4. Group together related occupations such as teachers, engineers, architect and architectural technician, etc. Researching related occupations at one time saves duplication of effort, especially in contacting professional associations.

C. Steps for Individual Occupations

1. Read Definition and Minimum Education in the write-up to make sure that the salary information you find is for the occupation as defined in SIGI. Read Advancement to see what top levels in the occupation might be used for top salary. Read the salary information already in SIGI to see what categories of information were given in the past for beginning, average, and top pay.

2. Check these sources:

   -- doc card for previous year to see what sources were used
   -- $ cards for the occupation in "Unread Material" drawer to see what new materials may be available
   -- professional associations
   -- JOB Bank summaries
   -- PATCO report on Civil Service classifications
   -- (If no other sources are available, phone OOH and ask what sources they have used for the occupation and contact the sources directly. Avoid using the OOH itself, except for general ballpark estimates. Even the latest edition contains figures almost 3 years old.)

3. Write up the information, following directions for salary information for new write-ups (Chapter II, Section IV-A-10, 11, 12, 13).

4. Check rating to see if it should be changed. Include new rating in margin, if a change is needed.

5. Record all changes in rating. This should be done on the summary printout, provided by the computer operator, which lists occupations by Income ratings. When a rating is changed, the occupational title is crossed out and added to the new category. A printout used in this way makes it possible to compare occupations and spot those that seem to be out of line. Rating changes should also be recorded on the Occupational Rating Sheet (Exhibit II-25).

6. Confirm information on salary variability and revise, if appropriate.
7. Document and date changes on doc card.
8. Send new information to computer operator.

III. Biennial Review of All SIGI Occupations

A complete review of all the occupational information in SIGI, including the answers to COMPARE questions and information in the Overview should be undertaken every two years in conjunction with the release of the latest *OOH*. If it is not possible to undertake a thorough review, the following categories, at the very least, must be revised:

- outlook and security
- % women
- licensing, certification, and continuing education requirements
- reference

The general procedure for an overall review of all occupational information in SIGI follows. In addition, specific directions for revising the four categories listed above are included.

A. Complete Review of all Occupational Information

The following is a list of general directions for undertaking a complete review. More detailed steps may be added at the time of the review.

1. Check the "Unread Material" drawer for sources of new information on SIGI occupations.
2. See if there are related occupations. Do all at once.
3. Read entire write-up (including overview) for consistency and clarity.
4. Check documentation cards to see if sources need to be updated. Use the latest OOH and other sources (such as professional association) as appropriate. Write and document changes.
5. Check all value ratings on the occupational ratings sheet at the beginning of the write-up. Note any changes in ratings on the ratings sheet and on the computer printouts listing all occupations by value and rating. Document and date any changes on the doc card.
6. Put occupation on the list for Fall $ update, if appropriate.
7. Check and update the cross-reference card for each occupation (refer to key). These cards will be used for updated SIGI terminal list and for update of list of occupations covered by SIGI.
8. Send revised write-up to occupational reviewer(s) if major changes have been made which require confirmation. Otherwise, careful documentation is enough.
9. If the overview is changed, see Chapter IV of the Handbook for further directions.
10. Review contents of folder. Discard outdated materials (particularly $ surveys which have been updated). Discard bib cards for old material.
11. Keep a list of occupations which have been reviewed to make sure that none is omitted.

B. Outlook and Security

1. Since the Bureau of Labor Statistics estimates for outlook are computed every two years for the OOH, check outlook for all SIGI occupations as soon as a new edition of the OOH appears (sometime between March and September of the year of revision).

2. Change wording of Outlook if necessary, following the directions for outlook statements under new write-ups (See Chapter II, Section IV-A-24.) Document and date changes on the doc card. Send the changes to the computer operator.

3. Investigate the effect of Outlook changes on the Job Security rating and statement. (See Chapter II, Section IV-A-26.)

4. Change the statement and possibly the rating for Security. Document and date changes on the doc card. Send the changes to the computer operator.

5. An alphabetical list of SIGI occupations may be used to check off occupations as they are completed.

C. % Women

1. Check all occupations in SIGI for changes in % Women as given by the new OOH as soon as it comes out.

2. If there is reason to question the figures for any occupation, make a call to the professional association to double check.

3. Write up any changes. Document and date changes on the doc card. Send to computer operator.

4. Keep a list of occupations checked as they are completed.

D. Licensing, Certification, and Continuing Education Requirements

1. Check the new edition of the OOH, as soon as it comes out, for changes in licensing, certification, or continuing education.

2. If there is reason to believe changes have been made, telephone the national association for further information.

3. Write out the changes to be made in Other Requirements, following directions and keeping within character count for the frame. Check the Overview to see if any changes should be reflected there. Any changes in the Overview must be noted for the Planning Manual (See Chapter IV).

4. Document and date changes in either category. Send new wording to computer operator.

5. Keep a list of occupations checked as they are completed.

E. Reference (Where to get more information)

References must be checked for two reasons: (a) to see if the organization still provides free literature about the occupation or is prepared to handle student inquiries, and (b) to see if the address is current. Surprisingly, the organizations cited as references tend to change their addresses frequently.

1. Telephone the organization listed as a reference. Do this in conjunction with gathering other information about outlook, % women, etc., if possible. Check the two points mentioned above. In some cases, a new reference will have to be identified.

2. Note any change in address on the professional association and/or reviewer card. Send change to computer operator. Record date change was made. If no change was made, record the date when the old address was confirmed.

3. Keep a list of occupations checked for Reference to make sure all have been checked.

IV. Review as Needed

When no scheduled review is in progress, check the card drawer for dup bibs in "Unread Material." A notation on the card will tell where the new materials are filed.

Check the new materials against the current write-up in the computer. Write up any changes that need to be made. Refer to Section III of this chapter and appropriate sections of Chapter II, "Adding a New Occupation to SIGI,"to determine how to revise old information.

Document and date all changes on the doc cards and send the revisions to the computer operator.

CHAPTER IV: RELEASING OCCUPATIONAL INFORMATION TO SIGI USERS AND UPDATING LISTS

For the most part, research assistants preparing occupational information for SIGI do not need to be concerned about contacting SIGI user colleges. Their responsibility usually ends when information changes are sent to the computer operator. However, research assistants do have two responsibilities in this regard: (1) they must notify SIGI users of changes that might affect their Planning systems and (2) they must distribute up-to-date lists of SIGI occupations to SIGI users.

Basically, research assistants should know that SIGI operates from two disks. Disk A, containing the basic script, is the same for all colleges. Disk B is different for every college.

The contents of the two disks are as follows:

Disk A:	Introduction Values Locate (based on value ratings assigned by research assistants) Compare (the occupational information prepared by the research assistants) Planning (through overview) Strategy
Disk B:	Prediction Planning (college-specific portion)

SIGI will run with Disk A alone, with Disk A + Prediction, with Disk A + Planning, or with Disk A + all of Disk B.

Throughout the year, changes and revisions are entered on the master tape for Disk A at Princeton. Once a year, in January, this master tape is used to prepare updated copies of Disk A for distribution to all the SIGI-user colleges. The project director has the responsibility for sending out the revised Disk A's.

Disk B information (Prediction and Planning) is prepared jointly by SIGI staff and the individual user college. Information on each occupation is provided by the SIGI staff in the form of overview pages for the Planning Manual, one for each occupation in SIGI. The research assistants prepare the overview page. (See Chapter II, Section IV-C.) The college prepares the Planning information. (prerequisites, courses of study, follow-on colleges, etc.).

Changes made by the research assistants in any overview pages may affect the Planning systems of individual colleges. The addition of new occupations will also affect Planning systems. However, if a college has a revised Disk A with new occupations, but Planning information is not yet available on Disk B, the computer will give the response "In preparation" until such time as the planning information for that occupation is made available on Disk B.

Procedures for providing SIGI users with the necessary information for their Planning systems follow in Section I. In Section II, the distribution of occupational lists is discussed.

I. Changes and Additions to the Planning System

A. New Overviews for New Occupations

1. Make a copy of the overview page as originally typed for the computer operator, including the name of the occupation, classification, overview, possible curricula, suggested electives, and special notes. File it in a folder marked, "New Overviews."

2. When approximately six overviews have been collected, write the SIGI number assigned to each occupation next to the title and give the sheets to the secretary, along with the printout of the overview from the occupational notebooks.

3. Have the secretary reduce the overview printouts and prepare a Planning Manual page for each occupation by using the information on the original Overview Page. Also have the secretary make copies of these pages for distribution to SIGI users, to 2 SIGI staff Planning Manuals, and to the remaining Planning Manuals in stock.

4. Have the secretary type a cover letter to SIGI users. (See form letter, Exhibit IV-1.) The letter will go to the planning system coordinator for signature and necessary record keeping. A copy of the letter should be kept in the log.

5. When six additional overviews accumulate, begin the process again.

B. Changes in Overview Page for Old Occupations

As occupational information is revised, changes will be made in the overview page for the Planning Manuals. Most of these changes, including title changes, will not require revisions in Planning systems on the part of SIGI users. However, changes in classification and/or recommended programs of study will make it necessary for users to change their Planning system information. When users are not required to make revisions, they are given routine notification of changes when the new disk is released. When users are required to make revisions, they are notified well in advance of the release of the new disk (end of August for disk released in January). Consult the planning system coordinator if it is unclear whether users should be notified.

1. If users do not need to change their Planning system information:

   a. Keep a copy of revised overview pages in a folder marked, "Revised Overview Pages for Planning Manual." Pages kept in this folder need only show the occupational title and the correction as sent to the computer operator.

   b. Before the new disk is released, give the revised overviews, the revised overview printouts, and the old overview pages from the Planning Manual to the secretary. Have the secretary prepare new overview pages for Appendix A of the Planning Manual by following step A-3 above.

   c. Prepare a cover letter to be signed by the planning system coordinator. A copy of the letter should be kept in the log.

2. If users do need to change their Planning system information:

   a. Verify the fact with the planning system coordinator.

   b. Collect revised overview pages for these occupations in a folder marked, "Problem Overviews." Pages in this folder need only show the occupational title and the correction as sent to the computer operator.

   c. At the end of August, while there is still time for users to make major changes in their Planning system before the release of the new disk, prepare new overview pages for Appendix A of the Planning Manual. Give the revised overview, the revised overview printout, and the old overview page from the Planning Manual to the secretary. Have the secretary prepare new overview pages for Appendix A of the Planning Manual by following step A-3 above.

   d. Prepare a cover letter to be signed by the planning system coordinator. This letter should explain in detail the reasons for the changes and what they are. A copy of the letter should be kept in the log.

II. Revision and Distribution of Cross-Reference, Alphabetical, and Numerical Lists

A. Cross-Reference List (See Appendix C.)

A cross-reference list is prepared for the SIGI terminals so that students can find occupations in which they are interested, even though the official SIGI title may be different from the one they have in mind. For example, students interested in fashion design might not think to look for "Clothing Designer #121," but if they look up Fashion Designer, they will find the number 121 to use in getting information from the computer. Research asstants must decide which alternate titles add to the usefulness of the list at the terminals and which merely add to the length. In general, only the most common alternate titles are included, and narrower classifications, sub-occupations and specialties are not. (For example, "Dress Designer," a narrower classification, is not used.)

1. As new occupations are added to SIGI, cross-reference cards are made and filed in the card catalog. (See Chapter II, Section IV-B .) As occupations are reviewed, other alternate titles may be added to the cross-reference cards. (See Chapter III, Section III-A, #7.)
2. Before the new disk is released, use the cross-reference cards to pick up additions and corrections to the previous list. Have a new list typed, dated, reduced, and printed. The use of colored paper makes it possible to distinguish between old and new lists at a glance.
3. Send multiple copies of the cross-reference lists to SIGI users. Coordinate this with the Project Director.

B. Alphabetical and Numerical Lists (See Appendices A & B.)

1. Before the new disk is released, add new or changed occupational titles to both lists. Have new copies typed and dated.
2. Keep multiple copies of both lists on hand. They are not sent routinely to SIGI users as is the cross-reference list, but should be available for requests. They are also useful for SIGI staff.

FORM LETTER RE TRANSMITTAL OF PLANNING MANUAL APPENDIX A PAGES*

January 27, 1976

Dear SIGI User:

We are expanding the SIGI occupational base to include 5 new occupations. You will have to prepare Planning system displays for them. Herewith are descriptive materials for each of the new occupations that you can use in writing the displays. Add them to Appendix A of the SIGI Planning System Manual.

In preparing the displays, follow the same procedures you used for the existing occupations:

1. Prepare a 3 x 5 card for each new occupation. (Page 14 of the manual.)

2. Select the program or programs at your college that prepare students for the occupation. (Pages 16-19 of the manual.)

3. If your college has no suitable program for the occupation, construct a Special display. Assign it the next number in your sequence of Special displays. Enter the number on the 3 x 5 card for the occupation. (Pages 24-25.)

4. If an existing program display can be used for one of the new occupations, enter its number on the 3 x 5 card for that occupation. (Page 20.)

5. If no existing program is suitable, prepare a program display for each option for the occupation. Assign it the next number in your sequence of program displays. Enter the number on the 3 x 5 card. (Pages 20-21.)

6. Determine the prerequisites for the program. If an existing Prerequisites insert is suitable for the program, enter its number on the 3 x 5 card. Otherwise, write a new Prerequisites insert and assign it the next number in your sequence of Prerequisites inserts. (Page 22.)

7. If the program requires transfer to a 4-year college for completion, prepare a Follow-on Colleges display. Assign it the next number in your sequence of Follow-on Colleges displays. (Pages 23-24.)

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*Send to planning contact at all SIGI user colleges.

EXHIBIT IV-1 (cont.)

-2-

8. Prepare the index for the new occupations. (Page 28.)

9. Please send the completed displays and index to

Mr. Warren Chapman
Research Psychologist
Educational Testing Service
Princeton, NJ 08540

The occupational information for the new occupations will be on the updated version of disk A that you receive about the first of each year. When we send the disk, we will also send instructions for copying and installing it, and we will send a new list of SIGI occupations for student use at the terminal.

When you have returned to us your Planning system displays for the new occupations, we will add them to your disk B. We will then send you a copy of the new disk B with instructions for getting it onto your system.

Your SIGI will run satisfactorily if you have a disk A containing the new occupations, but your disk B does not yet have the Planning system displays for the same occupations. If students call for one of the new occupations, they will get a Special display telling them that the Planning displays are in preparation and advising them to see a counselor.

Call me at (609) 921-9000, ext. 2395, if you have any questions about the new occupations.

Sincerely,

Warren

Warren Chapman
Research Psychologist

WC:mb
Enc.: Appendix A inserts for:
(titles of occupations)

OCCUPATIONAL TITLES WITH NUMBERS

ALPHABETICAL LIST OF SIGI TITLES

Accountant - 104
Actor/Actress - 101
Actuary - 112
Advertising Copywriter - 102
Aerospace Engineer - 231
Aircond., Refrig., & Heating Mechanic - 103
Aircraft Mechanic - 105
Appliance Repair Tech. - 106
Architect - 107
Architectural Tech. - 109
Automobile Mechanic - 111
Automobile Salesworker - 108
Avionics Technician - 110
Bank Officer - 118
Bank Teller - 119
Beautician - 114
Bookkeeper - 116
Botanist - 115
Broadcast Technician - 113
Business Mach. Repair Tech. - 117
Chef/Cook - 249
Chemical Engineer - 122
Chemist - 123
Civil Engineer - 127
Clergy - 124
Clothing Designer - 121
Commercial Artist - 120
Computer Operator - 125
Computer Programmer - 126
Construction Inspector - 239
Correction Officer - 240
Dancer/Dancing Teacher - 134
Dental Assistant - 128
Dental Hygienist - 130
Dentist - 129
Diesel Mechanic - 133
Dietitian - 132
Draftsman - 131

Economist - 135
EEG Technologist - 245
Electrical Engineer - 136
Electronics Technician - 138
Engineering Technician - 137
Farmer - 255
Fine Artist/Private Art Teacher-139
Firefighter - 232
Flight Attendant - 142
Flight Engineer - 141
Florist - 247
Food Scientist/Technologist - 251
Forester - 143
Funeral Director - 140
Geographer - 144
Geologist - 241
Home Economist - 145
Hospital Administrator - 242
Hotel-Motel Manager - 146
Industrial Designer - 151
Industrial Engineer - 149
Industrial Traffic Mgr. - 150
Instrument Repair Tech. - 152
Insurance Agent - 147
Interior Decorator - 148
Interpreter/Translator - 253
Keypunch Operator - 233
Labor Relations Spec. - 155
Landscape Architect - 234
Lawyer - 157
Legal Assistant - 254
Librarian - 154
Library Technician - 156
Machinist - 169
Manufacturer's Salesworker - 166
Market Researcher - 165
Mathematician - 158
Mechanical Engineer - 160
Medical Lab. Tech. - 163

Medical Record Admin. - 162
Medical Technologist - 167
Meteorologist - 161
Model - 164
Musician - 168
Newspaper Reporter - 171
Nurse, Practical - 181
Nurse, Registered - 193
Nurseryman/Landscaper - 170
Nursing Assistant - 246
Occupational Therapist - 174
Oceanographer - 172
Operating Room Technician - 235
Optician - 173
Optometrist - 236
Personnel Interviewer - 186
Pharmacist - 180
Photographer - 182
Physical Therapist - 185
Physician - 159
Physician's Assistant - 243
Physicist - 184
Pilot - 178
Plumber - 250
Police Officer - 176
Political Scientist - 179
Production Manager - 187
Psychologist - 188
Public Health Specialist - 177
Public Relations Worker - 183
Purchasing Agent - 175
Radio/TV Announcer - 189
Radio/TV Service Technician - 196
Real Estate Agent - 192
Receptionist - 191
Recreation Worker - 197
Rehabilitation Counselor - 190
Respiratory Therapist - 194
Retail Store Manager - 195
School Counselor - 202

Science Lab. Technician - 153
Secretary - 201
Securities Broker - 200
Singer & Singing Teacher - 206
Social Service Aide - 204
Social Worker - 208
Soil Conservationist - 199
Speech Path/Audiologist - 205
Statistician - 203
Stenographer - 244
Surveyor - 207
Systems Analyst - 198
Teacher Aide - 209
Teacher, Art - 220
Teacher, Biology - 221
Teacher, Business - 222
Teacher, Early Childhood - 237
Teacher, Elementary School - 212
Teacher, English/Lang. Arts - 223
Teacher, Foreign Language - 224
Teacher, History - 225
Teacher, Indus. Arts - 226
Teacher, Mathematics - 227
Teacher, Phys. Education - 228
Teacher, Phys. Science - 229
Teacher, Special Education - 238
Teacher, Voc/Tech - 248
Technical Writer - 214
Telephone Craftsworker - 210
Television Producer/Director - 252
Tool and Die Maker - 211
Typist - 215
Urban Planner - 216
Veterinarian - 217
Wastewater Treat. Operator - 218
Welder - 230
X-Ray Technologist - 219
Zoologist - 213
General Studies - 345

Revised 2/76

APPENDIX B

NUMERICAL LIST OF SIGI TITLES

SIGI OCCUPATIONS (numerical order)

101 - Actor/Actress
102 - Advertising Copywriter
103 - Aircond., Refrig., & Heating Mechanic
104 - Accountant
105 - Aircraft Mechanic
106 - Appliance Repair Tech.
107 - Architect
108 - Automobile Salesworker
109 - Architectural Technician
110 - Avionics Technician
111 - Automobile Mechanic
112 - Actuary
113 - Broadcast Technician
114 - Beautician
115 - Botanist
116 - Bookkeeper
117 - Business Mach. Repair Tech.
118 - Bank Officer
119 - Bank Teller
120 - Commercial Artist
121 - Clothing Designer
122 - Chemical Engineer
123 - Chemist
124 - Clergy
125 - Computer Operator
126 - Computer Programmer
127 - Civil Engineer
128 - Dental Assistant
129 - Dentist
130 - Dental Hygienist
131 - Draftsman
132 - Dietitian
133 - Diesel Mechanic
134 - Dancer/Dancing Teacher
135 - Economist
136 - Electrical Engineer
137 - Engineering Technician
138 - Electronics Technician
139 - Fine Artist
140 - Funeral Director
141 - Flight Engineer
142 - Flight Attendant
143 - Forester
144 - Geographer
145 - Home Economist
146 - Hotel/Motel Manager
147 - Insurance Agent
148 - Interior Decorator
149 - Industrial Engineer
150 - Industrial Traffic Manager
151 - Industrial Designer
152 - Instrument Repair Tech.
153 - Science Lab. Technician
154 - Librarian
155 - Labor Relations Specialist
156 - Library Technician
157 - Lawyer
158 - Mathematician
159 - Physician
160 - Mechanical Engineer
161 - Meteorologist
162 - Medical Record Admin.
163 - Medical Lab. Technician
164 - Model
165 - Market Researcher
166 - Manufacturer's Salesworker
167 - Medical Technologist
168 - Musician
169 - Machinist
170 - Nurseryman/Landscaper
171 - Newspaper Reporter
172 - Oceanographer
173 - Optician
174 - Occupational Therapist
175 - Purchasing Agent
176 - Police Officer
177 - Public Health Specialist
178 - Pilot
179 - Political Scientist
180 - Pharmacist
181 - Nurse, Practical
182 - Photographer
183 - Public Relations Worker
184 - Physicist
185 - Physical Therapist
186 - Personnel Interviewer
187 - Production Manager
188 - Psychologist
189 - Radio/TV Announcer
190 - Rehabilitation Counselor
191 - Receptionist
192 - Real Estate Agent
193 - Nurse, Registered
194 - Respiratory Therapist
195 - Retail Store Manager
196 - Radio/TV Service Technician
197 - Recreation Worker
198 - Systems Analyst
199 - Soil Conservationist
200 - Securities Broker
201 - Secretary
202 - School Counselor
203 - Statistician
204 - Social Service Aide
205 - Speech Path/Audiologist
206 - Singer/Singing Teacher
207 - Surveyor
208 - Social Worker
209 - Teacher Aide
210 - Telephone Craftsworker
211 - Tool and Die Maker
212 - Teacher, Elem. School
213 - Zoologist
214 - Technical Writer
215 - Typist
216 - Urban Planner
217 - Veterinarian
218 - Wastewater Treat. Operator
219 - X-Ray Technologist
220 - Teacher, Art
221 - Teacher, Biology
222 - Teacher, Business
223 - Teacher, English/Lang. Arts
224 - Teacher, Foreign Language
225 - Teacher, History/Social Studies
226 - Teacher, Indus. Arts
227 - Teacher, Mathematics
228 - Teacher, Physical Education
229 - Teacher, Physical Science
230 - Welder
231 - Aerospace Engineer
232 - Firefighter
233 - Keypunch Operator
234 - Landscape Architect
235 - Operating Room Technician
236 - Optometrist
237 - Teacher, Early Childhood
238 - Teacher, Special Education
239 - Construction Inspector
240 - Correction Officer
241 - Geologist
242 - Hospital Administrator
243 - Physician's Assistant
244 - Stenographer
245 - EEG Technologist
246 - Nursing Assistant
247 - Florist
248 - Teacher, Voc/Tech
249 - Chef/Cook
250 - Plumber
251 - Food Scientist/Technologist
252 - Television Producer/Director
253 - Interpreter/Translator
254 - Legal Assistant
255 - Farmer
345 - (General Studies)

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APPENDIX C
CROSS-REFERENCE LIST OF SIGI OCCUPATIONS

SIGI OCCUPATIONS

Accountant - 104
Actor/Actress - 101
Actuary - 112
Advertising Copywriter - 102
Aerospace Engineer - 231
Aide, Social Service - 204
Aide, Teacher - 209
Aircond., Refrig., & Heating Mechanic - 103
Aircraft Mechanic - 105
Airline Attendant - 142
Airline Pilot - 178
Animal Biologist - 213
Appliance Repair Technician - 106
Arbitrator - 155
Architect - 107
Architectural Technician - 109
Art Director, Commercial - 120
Art Teacher, Public School - 220
Art Teacher, Private - 139
Artist, Commercial - 120
Artist, Fine Artist - 139
Attorney - 157
Attorney's Assistant - 254
Audiologist/Speech Pathologist - 205
Automobile Mechanic - 111
Automobile Salesworker - 108
Avionics Technician - 110
Bank Officer - 118
Bank Teller - 119
Beautician - 114
Biological Scientist, Botanist - 115
Biological Scientist, Zoologist - 213
Biology Teacher - 221
Blind, Teacher of - 238
Bookkeeper - 116
Botanist - 115
Broadcast Technician - 113
Broadcasting Producer/Director - 252
Broker, Securities - 200
Building Inspector - 239
Business Machine Repair Tech. - 117
Business Teacher - 222
Buyer - 175
Caseworker - 208
Chef/Cook - 249
Chemical Engineer - 122
Chemist - 123
Chemistry Teacher - 229
City Planner - 216
Civil Engineer - 127
Clergy - 124
Clerk-Typist - 215
Clinical Nurse Practitioner - 243
Clinical Psychologist - 188
Clothing Designer - 121
Coach, Athletic - 228
College Teacher (see field to be taught)
Commercial Artist - 120
Community Planner - 216
Community Service Aide - 204
Computer Operator - 125
Computer Programmer - 126
Conservationist - 199
Construction Inspector - 239
Cook/Chef - 249
Co-pilot - 178
Correction Officer - 240
Cosmetologist - 114
Counselor, Rehabilitation - 190
Counselor, School Guidance - 202
Court Reporter - 244
Dancer/Dancing Teacher - 134
Data Processing Operator - 125
Data Processing Programmer - 126
Data Processing Technician - 233
Day Care Teacher - 237
Deaf, Teacher of - 238
Dental Assistant - 128
Dental Hygienist - 130
Dentist - 129
Designer, Clothing - 121
Designer, Floral - 247
Designer, Industrial - 151
Designer, Interior - 148
Detective - 176
Diesel Mechanic - 133
Dietitian - 132
Director/Producer, Television - 252
Disc Jockey - 189
Doctor, Physician - 159
Doctor, Optometrist - 236
Drafting Technologist - 131
Draftsman - 131
Druggist - 180
Earth Science Teacher - 229
Earth Scientist - 241
Ecologist, Botanist - 115
Ecologist, Forester - 143
Ecologist, Public Health Specialist - 177
Ecologist, Soil Conservationist-199
Ecologist, Wastewater Treatment Operator - 218
Ecologist, Zoologist - 213
Economist - 135
EEG Technologist - 245
Electrical Engineer - 136
Electroencephalographic Technician - 245
Electronics Technician - 138
Elementary School Teacher - 212
Embalmer - 140
Engineering Technician - 137
English Teacher - 223
Engineer, Aerospace - 231
Engineer, Chemical - 122
Engineer, Civil - 127
Engineer, Electrical - 136
Engineer, Industrial - 149
Engineer, Mechanical - 160
Environmental Health Officer - 177
Executive Secretary - 201
Farmer/Farm Manager - 255
Fashion Designer - 121
Fine Artist/Private Art Teacher - 139
Firefighter - 232
Fireman - 232
Flight Attendant - 142
Flight Engineer - 141
Floral Designer - 247
Florist - 247
Food Scientist/Technologist - 251
Forester - 143
French Teacher - 224
Funeral Director - 140
Geographer - 144
Geologist - 241
German Teacher - 224
Guard, Prison - 240
Guidance Counselor - 202
Gym Teacher - 228
Hairdresser - 114
Heating Mechanic - 103
History Teacher - 225
Home Economist - 145
Hospital Administrator - 242
Hospital Assistant - 243
Hospital Attendant - 246
Hotel/Motel Manager - 146
Industrial Arts Teacher - 226

This list also includes alternate titles for many of the occupations in SIGI.
All titles will direct you to the correct number for the occupation.

[See next page]

SIGI OCCUPATIONS (Cont.)*

Industrial Designer - 151
Industrial Engineer - 149
Industrial Traffic Manager - 150
Inhalation Therapist - 194
Instrument Repair Technician - 152
Insurance Agent - 147
Interior Decorator/Designer - 148
Interpreter/Translator - 253
Journalist - 171
Keypunch Operator - 233
Kindergarten Teacher, Private School - 237
Kindergarten Teacher, Public School - 212
Labor Relations Specialist - 155
Laboratory Technician, Medical - 163
Laboratory Technician, Science - 153
Landscape Architect - 234
Landscaper - 170
Law Enforcement Officer, Police - 176
Law Enforcement Officer, Corrections - 240
Lawyer - 157
Legal Analyst - 254
Legal Assistant - 254
Legal Paraprofessional - 254
Legal Technician - 254
Librarian - 154
Librarian, Medical Record - 162
Library Technician - 156
Licensed Practical Nurse - 181
Machinist - 169
Manager, Hotel/Motel - 146
Manager, Industrial Traffic - 150
Manager, Production - 187
Manager, Retail Store - 195
Manufacturer's Salesworker - 166
Marine Biologist - 172
Market Researcher - 165

Math Teacher - 227
Mathematician - 158
Mechanic, Aircond., Refrig., & Heating - 103
Mechanic, Aircraft - 105
Mechanic, Automobile - 111
Mechanic, Diesel - 133
Mechanical Engineer - 160
Medical Laboratory Technician - 163
Medical Record Administrator - 162
Medical Technologist - 167
Meteorologist - 161
Minister - 124
Model - 164 .
Mortician - 140
Motel/Hotel Manager - 146
Music Teacher - 168
Musician/Music Teacher - 168
Newspaper Reporter - 171
Nurse Aide - 246
Nurse, Practical - 181
Nurse, Practitioner - 243
Nurse, Registered - 193
Nursery School Teacher - 237
Nurseryman/Landscaper - 170
Nursing Assistant - 246
Nutritionist - 132
Occupational Therapist - 174
Oceanographer - 172
Operating Room Technician - 235
Optician - 173
Optometrist - 236
Orderly, Hospital - 246
Paralegal Specialist - 254
Painter/Artist - 139
Personnel Interviewer - 186
Pharmacist - 180
Photographer - 182

Physical Education Teacher - 228
Physical Therapist - 185
Physician - 159
Physician's Assistant - 243
Physician's Associate - 243
Physicist - 184
Physics Teacher - 229
Pilot - 178
Planner, Urban - 216
Plant Scientist - 115
Plumber - 250
Police Officer - 176
Political Scientist - 179
Practical Nurse - 181
Preschool Teacher - 237
Priest - 124
Prison Guard - 240
Producer/Director, Television - 252
Production Manager - 187
Psychiatric Aide - 246
Psychologist - 188
Public Health Specialist - 177
Public Relations Worker - 183
Purchasing Agent - 175
Rabbi - 124
Radio/TV Announcer - 189
Radio/TV Broadcast Technician - 113
Radio/TV Service Technician - 196
Radiologic Technician - 219
Real Estate Agent - 192
Receptionist - 191
Recreation Worker - 197
Refrigeration Mechanic - 103
Registered Nurse - 193
Rehabilitation Counselor - 190
Reporter, Newspaper - 171
Respiratory Therapist - 194

Retail Florist - 247
Retail Store Manager - 195
Salesworker, Automobile - 108
Salesworker, Insurance Agent - 147
Salesworker, Manufacturer's - 166
Salesworker, Real Estate Agent - 192
Salesworker, Securities Broker - 200
Sanitarian - 177
School Counselor - 202
Science Laboratory Technician - 153
Sculptor/Artist - 139
Secondary School Teacher, Art - 220
Secondary School Teacher, Biology-221
Secondary School Teacher, Business-222
Secondary School Teacher, English/Language Arts - 223
Secondary School Teacher, Foreign Language - 224
Secondary School Teacher, History -225
Secondary School Teacher, Industrial Arts - 226
Secondary School Teacher, Math - 227
Secondary School Teacher, Music-168
Secondary School Teacher, Physical Education - 228
Secondary School Teacher, Physical Science - 229
Secondary School Teacher, Vocational/Technical - 248
Secretary - 201
Securities Broker - 200
Sewage Plant Operator - 218
Shorthand Reporter - 244
Singer/Singing Teacher - 206
Social Service Aide - 204
Social Studies Teacher - 225
Social Worker - 208
Soil Conservationist - 199

[See next page]

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* This list also includes alternate titles for many of the occupations in SIGI. All titles will direct you to the correct number for the occupation.

SIGI OCCUPATIONS (Cont.)*

Spanish Teacher - 224
Special Education Teacher - 238
Speech Pathologist/Audiologist - 205
Sports Reporter, Newspaper - 171
Sports Reporter, Radio/TV - 189
Statistician - 203
Stenographer - 244
Steward/Stewardess - 142
Stockbroker - 200
Store Manager - 195
Surgical Technician - 235
Surveyor - 207
Systems Analyst - 198
Teacher Aide - 209
Teacher, Art - 220
Teacher, Biology - 221
Teacher of the Blind - 238
Teacher, Business - 222
Teacher, Dance - 134
Teacher, Day Care - 237
Teacher of the Deaf - 238
Teacher, Early Childhood - 237
Teacher, Elementary School - 212
Teacher, English/Lang. Arts - 223
Teacher, Exceptional Children - 238
Teacher, Foreign Language - 224
Teacher, History - 225
Teacher, Home Economics - 145
Teacher, Industrial Arts - 226
Teacher, Kindergarten (Private School) - 237
Teacher, Kindergarten (Public School) - 212
Teacher, Language Arts - 223
Teacher, Mathematics - 227
Teacher of the Mentally Retarded - 238
Teacher, Music - 168
Teacher, Nursery School - 237
Teacher, Physical Education - 228
Teacher, Physical Science - 229
Teacher, Preschool - 237
Teacher, Private Art - 139
Teacher, Singing - 206
Teacher, Social Studies - 225
Teacher, Special Education - 238
Teacher, Vocational/Technical -248
Technical Writer - 214
Telephone Craftsworker - 210
Television Producer/Director - 252
Therapist, Occupational - 174
Therapist, Physical - 185
Therapist, Respiratory - 194
Tool & Die Maker - 211
Trade School Teacher - 248
Translator/Interpreter - 253
Typist - 215
TV/Radio Announcer - 189
TV/Radio Broadcast Technician -113
TV/Radio Service Technician - 196
Urban Planner - 216
Veterinarian - 217
Vocational/Technical Teacher - 248
Wastewater Treatment Operator - 218
Weather Forecaster - 161
Welder - 230
Writer, Advertising Copywriter-102
Writer, Newspaper Reporter - 171
Writer, Technical - 214
X-Ray Technologist - 219
Zoologist - 213

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* This list also includes alternate titles for many of the occupations in SIGI. All titles will direct you to the correct number for the occupation.

CONVERSION CHART FOR HOURLY, WEEKLY, MONTHLY, ANNUAL PAY

WAGE AND SALARY CONVERSION TABLE

by Philip H. Weber Salary Administration Services

A. S. Hansen, inc.

Hour	Week	Month	Year	Hour	Week	Month	Year	Hour	Week	Month	Year	Hour	Week	Month	Year
$1.60	$ 64.00	$277.33	$ 3,328.00	$1.93	$ 77.20	$334.53	$ 4,014.40	$2.26	$ 90.40	$391.73	$ 4,700.80	$2.596	$103.85	$450.00	$ 5,400.00
1.61	64.40	279.07	3,348.80	1.933	77.31	335.00	4,020.00	2.27	90.80	393.47	4,721.60	2.60	104.00	450.67	5,408.00
1.615	64.62	280.00	3,360.00	1.94	77.60	336.27	4,035.20	2.275	91.00	394.33	4,732.00	2.61	104.40	452.40	5,428.80
1.62	64.80	280.80	3,369.60	1.95	78.00	338.00	4,056.00	2.279	91.15	395.00	4,740.00	2.62	104.80	454.13	5,449.60
1.625	65.00	281.67	3,380.00	1.96	78.40	339.73	4,076.80	2.28	91.20	395.20	4,742.40	2.625	105.00	455.00	5,460.00
1.63	65.20	282.53	3,390.40	1.962	78.46	340.00	4,080.00	2.29	91.60	396.93	4,763.20	2.63	105.20	455.87	5,470.40
1.635	65.38	283.33	3,400.00	1.97	78.80	341.47	4,097.60	2.30	92.00	398.67	4,784.00	2.64	105.60	457.60	5,491.20
1.64	65.60	284.27	3,411.20	1.971	78.85	341.67	4,100.00	2.308	92.31	400.00	4,800.00	2.644	105.77	458.33	5,500.00
1.644	65.77	285.00	3,420.00	1.975	79.00	342.33	4,108.00	2.31	92.40	400.40	4,804.80	2.65	106.00	459.33	5,512.00
1.65	66.00	286.00	3,432.00	1.98	79.20	343.20	4,118.40	2.32	92.80	402.13	4,825.60	2.654	106.15	460.00	5,520.00
1.66	66.40	287.73	3,452.80	1.99	79.60	344.93	4,139.20	2.325	93.00	403.00	4,836.00	2.66	106.40	461.07	5,532.80
1.67	66.80	289.47	3,473.60	1.99	79.62	345.00	4,140.00	2.33	93.20	403.87	4,846.40	2.67	106.80	462.80	5,553.60
1.673	66.92	290.00	3,480.00	2.00	80.00	346.67	4,160.00	2.337	93.46	405.00	4,860.00	2.675	107.00	463.67	5,564.00
1.675	67.00	290.33	3,484.00	2.01	80.40	348.40	4,180.80	2.34	93.60	405.60	4,867.20	2.68	107.20	464.53	5,574.40
1.68	67.20	291.20	3,494.40	2.019	80.77	350.00	4,200.00	2.35	94.00	407.33	4,888.00	2.683	107.31	465.00	5,580.00
1.683	67.31	291.67	3,500.00	2.02	80.80	350.13	4,201.60	2.356	94.23	408.33	4,900.00	2.69	107.60	466.27	5,595.20
1.69	67.60	292.93	3,515.20	2.025	81.00	351.00	4,212.00	2.36	94.40	409.07	4,908.80	2.692	107.69	466.67	5,600.00
1.70	68.00	294.67	3,536.00	2.03	81.20	351.87	4,222.40	2.365	94.62	410.00	4,920.00	2.70	108.00	468.00	5,616.00
1.702	68.06	295.00	3,540.00	2.04	81.60	353.60	4,243.20	2.37	94.80	410.80	4,929.60	2.71	108.40	469.73	5,636.80
1.71	68.40	296.40	3,556.80	2.048	81.92	355.00	4,260.00	2.375	95.00	411.67	4,940.00	2.712	108.46	470.00	5,640.00
1.72	68.80	298.13	3,577.60	2.05	82.00	355.33	4,264.00	2.38	95.20	412.53	4,950.40	2.72	108.80	471.47	5,657.60
1.725	69.00	299.00	3,588.00	2.06	82.40	357.07	4,284.80	2.39	95.60	414.27	4,971.20	2.725	109.00	472.33	5,668.00
1.73	69.20	299.87	3,598.40	2.067	82.69	358.33	4,300.00	2.394	95.77	415.00	4,980.00	2.73	109.20	473.20	5,678.40
1.731	69.23	300.00	3,600.00	2.07	82.80	358.80	4,305.60	2.40	96.00	416.00	4,992.00	2.74	109.60	474.93	5,699.20
1.74	69.60	301.60	3,619.20	2.075	83.00	359.67	4,316.00	2.404	96.15	416.67	5,000.00	2.74	109.62	475.00	5,700.00
1.75	70.00	303.33	3,640.00	2.077	83.08	360.00	4,320.00	2.41	96.40	417.73	5,012.80	2.75	110.00	476.67	5,720.00
1.76	70.38	305.00	3,660.00	2.08	83.20	360.53	4,326.40	2.42	96.80	419.47	5,033.60	2.76	110.40	478.40	5,740.80
1.76	70.40	305.07	3,660.80	2.09	83.60	362.27	4,347.20	2.423	96.92	420.00	5,040.00	2.769	110.77	480.00	5,760.00
1.77	70.80	306.80	3,681.60	2.10	84.00	364.00	4,368.00	2.425	97.00	420.33	5,044.00	2.77	110.80	480.13	5,761.60
1.775	71.00	307.67	3,692.00	2.106	84.23	365.00	4,380.00	2.43	97.20	421.20	5,054.40	2.775	111.00	481.00	5,772.00
1.779	71.15	308.33	3,700.00	2.11	84.40	365.73	4,388.80	2.44	97.60	422.93	5,075.20	2.78	111.20	481.87	5,782.40
1.78	71.20	308.53	3,702.40	2.115	84.62	366.67	4,400.00	2.45	98.00	424.67	5,096.00	2.788	111.54	483.33	5,800.00
1.788	71.54	310.00	3,720.00	2.12	84.80	367.47	4,409.60	2.452	98.08	425.00	5,100.00	2.79	111.60	483.60	5,803.20
1.79	71.60	310.27	3,723.20	2.125	85.00	368.33	4,420.00	2.46	98.40	426.40	5,116.80	2.798	111.92	485.00	5,820.00
1.80	72.00	312.00	3,744.00	2.13	85.20	369.20	4,430.40	2.47	98.80	428.13	5,137.60	2.80	112.00	485.33	5,824.00
1.81	72.40	313.73	3,764.80	2.135	85.38	370.00	4,440.00	2.475	99.00	429.00	5,148.00	2.81	112.40	487.07	5,844.80
1.817	72.69	315.00	3,780.00	2.14	85.60	370.93	4,451.20	2.48	99.20	429.87	5,158.40	2.82	112.80	488.80	5,856.00
1.82	72.80	315.47	3,785.60	2.15	86.00	372.67	4,472.00	2.481	99.23	430.00	5,160.00	2.825	113.00	489.67	5,876.00
1.825	73.00	316.33	3,796.00	2.16	86.40	374.40	4,492.80	2.49	99.60	431.60	5,179.20	2.827	113.08	490.00	5,880.00
1.827	73.08	316.67	3,800.00	2.163	86.54	375.00	4,500.00	2.50	100.00	433.33	5,200.00	2.83	113.20	490.53	5,886.40
1.83	73.20	317.20	3,806.40	2.17	86.80	376.13	4,513.60	2.509	100.38	435.00	5,220.00	2.837	113.46	491.67	5,900.00
1.84	73.60	318.93	3,827.20	2.175	87.00	377.00	4,524.00	2.51	100.40	435.07	5,220.80	2.84	113.60	492.27	5,907.20
1.846	73.85	320.00	3,840.00	2.18	87.20	377.87	4,534.40	2.52	100.80	436.80	5,241.60	2.85	114.00	494.00	5,928.00
1.85	74.00	320.67	3,848.00	2.19	87.60	379.60	4,555.20	2.525	101.00	437.67	5,252.00	2.856	114.23	495.00	5,940.00
1.86	74.40	322.40	3,868.80	2.192	87.69	380.00	4,560.00	2.53	101.20	438.53	5,262.40	2.86	114.40	495.73	5,948.80
1.87	74.80	324.13	3,889.60	2.20	88.00	381.33	4,576.00	2.538	101.54	440.00	5,280.00	2.87	114.80	497.47	5,969.60
1.875	75.00	325.00	3,900.00	2.21	88.40	383.07	4,596.80	2.54	101.60	440.27	5,283.20	2.875	115.00	498.33	5,980.00
1.88	75.20	325.87	3,910.40	2.212	88.46	383.33	4,600.00	2.548	101.92	441.67	5,300.00	2.88	115.20	499.20	5,990.40
1.89	75.60	327.60	3,931.20	2.22	88.80	384.80	4,617.60	2.55	102.00	442.00	5,304.00	2.885	115.38	500.00	6,000.00
1.90	76.00	329.33	3,952.00	2.221	88.85	385.00	4,620.00	2.56	102.40	443.73	5,324.80	2.89	115.60	500.93	6,011.20
1.904	76.15	330.00	3,960.00	2.225	89.00	385.67	4,628.00	2.567	102.69	445.00	5,340.00	2.90	116.00	502.67	6,032.00
1.91	76.40	331.07	3,972.80	2.23	89.20	386.53	4,638.40	2.57	102.80	445.47	5,345.60	2.91	116.40	504.40	6,052.80
1.92	76.80	332.80	3,993.60	2.24	89.60	388.27	4,659.20	2.575	103.00	446.33	5,356.00	2.913	116.54	505.00	6,060.00
1.923	76.92	333.33	4,000.00	2.25	90.00	390.00	4,680.00	2.58	103.20	447.20	5,366.40	2.92	116.80	506.13	6,073.60
1.925	77.00	333.67	4,004.00	2.26	90.38	391.67	4,700.00	2.59	103.60	448.93	5,387.20	2.925	117.00	507.00	6,084.00

cont'd

Philip H. Weber Salary Administration Services A. S. Hansen, inc. 1080 Green Bay Road Lake Bluff, Illinois 60044

Hour	Week	Month	Year
$2.93	**$117.20**	$507.87	$6,094
2.933	117.31	508.33	**6,100**
2.94	117.60	509.60	6,115
2.942	117.69	**510.00**	6,120
2.95	**118.00**	511.33	6,136
2.96	118.40	513.07	6,156
2.97	118.80	514.80	6,177
2.971	118.85	**515.00**	6,180
2.975	**119.00**	515.67	6,188
2.98	119.20	516.53	6,198
2.981	119.23	516.67	**6,200**
2.99	119.60	518.27	6,219
3.00	**120.00**	**520.00**	6,240
3.029	121.15	**525.00**	**6,300**
3.05	**122.00**	528.67	6,344
3.058	122.31	**530.00**	6,360
3.077	123.08	533.33	**6,400**
3.10	**124.00**	537.33	6,448
3.115	124.62	**540.00**	6,480
3.125	**125.00**	541.67	**6,500**
3.15	**126.00**	546.00	6,552
3.173	126.92	**550.00**	**6,600**
3.20	**128.00**	554.67	6,656
3.221	128.85	558.33	**6,700**
3.231	129.23	**560.00**	6,720
3.25	**130.00**	563.33	6,760
3.269	130.77	566.67	**6,800**
3.288	131.54	**570.00**	6,840
3.30	**132.00**	572.00	6,864
3.317	132.69	**575.00**	**6,900**
3.346	133.85	**580.00**	6,960
3.35	**134.00**	580.67	6,968
3.365	134.62	583.33	**7,000**
3.375	**135.00**	585.00	**7,020**
3.40	**136.00**	589.33	7,072
3.404	136.15	**590.00**	7,080
3.413	136.54	591.67	**7,100**
3.45	**138.00**	598.00	7,176
3.462	138.46	**600.00**	**7,200**
3.50	**140.00**	606.67	7,280
3.51	140.38	608.33	**7,300**
3.519	140.77	**610.00**	7,320
3.55	142.00	615.33	7,384
3.558	142.31	616.67	**7,400**
3.577	143.08	**620.00**	7,440
3.60	144.00	624.00	7,488
3.606	144.23	**625.00**	**7,500**
3.625	145.00	628.33	7,540
3.635	145.38	**630.00**	7,560
3.65	146.00	632.67	7,592
3.654	146.15	633.33	**7,600**
3.692	147.69	**640.00**	7,680
3.70	**148.00**	641.33	7,696
3.702	148.08	641.67	**7,700**
3.75	**150.00**	**650.00**	**7,800**
$3.798	$151.92	$658.33	**$ 7,900**
3.80	**152.00**	658.67	7,904
3.808	152.31	**660.00**	7,920
3.846	153.85	666.67	**8,000**
3.85	**154.00**	667.33	8,008
3.865	154.62	**670.00**	8,040
3.875	**155.00**	671.67	8,060
3.894	155.77	**675.00**	**8,100**
3.90	**156.00**	676.00	8,112
3.923	156.92	**680.00**	8,160
3.942	157.69	683.33	**8,200**
3.95	**158.00**	684.67	8,216
3.981	159.23	**690.00**	8,280
3.99	159.62	691.67	**8,300**
4.00	**160.00**	693.33	8,320
4.038	161.54	**700.00**	**8,400**
4.05	**162.00**	702.00	8,424
4.087	163.46	708.33	**8,500**
4.096	163.85	**710.00**	8,520
4.10	**164.00**	710.67	8,528
4.125	**165.00**	715.00	8,580
4.135	165.38	716.67	**8,600**
4.15	**166.00**	719.33	8,632
4.154	166.15	**720.00**	8,640
4.183	167.31	**725.00**	**8,700**
4.20	**168.00**	728.00	8,736
4.212	168.46	**730.00**	8,760
4.231	169.23	733.33	**8,800**
4.25	170.00	736.67	8,840
4.269	170.77	**740.00**	8,880
4.279	171.15	741.67	**8,900**
4.30	**172.00**	745.33	8,944
4.327	173.08	**750.00**	**9,000**
4.35	**174.00**	754.00	9,048
4.375	**175.00**	758.33	**9,100**
4.385	175.38	**760.00**	9,120
4.40	**176.00**	762.67	9,152
4.423	176.92	766.67	**9,200**
4.442	177.69	**770.00**	9,240
4.45	**178.00**	771.33	9,256
4.471	178.85	**775.00**	9,300
4.50	**180.00**	**780.00**	9,360
4.519	180.77	783.33	**9,400**
4.55	**182.00**	788.67	9,464
4.558	182.31	**790.00**	9,480
4.567	182.69	791.67	**9,500**
4.60	**184.00**	797.33	9,568
4.615	184.62	**800.00**	**9,600**
4.625	**185.00**	801.67	9,620
4.65	**186.00**	806.00	9,672
$4.663	$186.54	$ 808.33	**$ 9,700**
4.673	186.92	**810.00**	9,720
4.70	**188.00**	814.67	9,776
4.712	188.46	816.67	**9,800**
4.731	189.23	**820.00**	9,840
4.75	**190.00**	823.33	9,880
4.76	190.38	**825.00**	**9,900**
4.788	191.54	**830.00**	9,960
4.80	**192.00**	832.00	9,984
4.808	192.31	833.33	**10,000**
4.846	193.85	**840.00**	10,080
4.85	**194.00**	840.67	10,088
4.856	194.23	841.67	**10,100**
4.875	**195.00**	**845.00**	10,140
4.90	**196.00**	849.33	10,192
4.904	196.15	**850.00**	**10,200**
4.95	**198.00**	858.00	10,296
4.952	198.08	858.33	**10,300**
4.962	198.46	**860.00**	10,320
5.00	**200.00**	866.67	**10,400**
5.048	201.92	**875.00**	**10,500**
5.192	207.69	**900.00**	10,800
5.288	211.54	916.67	**11,000**
5.337	213.46	**925.00**	11,100
5.481	219.23	**950.00**	11,400
5.625	**225.00**	**975.00**	11,700
5.769	230.77	**1,000.00**	**12,000**
5.913	236.54	**1,025.00**	12,300
6.058	242.31	**1,050.00**	12,600
6.202	248.08	**1,075.00**	12,900
6.25	**250.00**	1,083.33	**13,000**
6.346	253.85	**1,100.00**	13,200
6.49	259.62	**1,125.00**	13,500
6.63	265.38	**1,150.00**	13,800
6.731	269.23	1,166.67	**14,000**
6.779	271.15	**1,175.00**	14,100
6.875	**275.00**	1,191.67	14,300
6.923	276.92	**1,200.00**	14,400
7.067	282.69	**1,225.00**	14,700
7.212	288.46	**1,250.00**	**15,000**
7.356	294.23	1,275.00	15,300
7.50	**300.00**	**1,300.00**	15,600
7.644	305.77	1,325.00	15,900
7.692	307.69	1,333.33	**16,000**
7.788	311.54	**1,350.00**	16,200
7.933	317.31	1,375.00	16,500
8.077	323.08	**1,400.00**	16,800
8.125	**325.00**	1,408.33	16,900
8.173	326.92	1,416.67	17,000
8.221	328.85	1,425.00	17,100
$ 8.365	$334.62	$1,450.00	$17,400
8.51	340.38	1,475.00	17,700
8.654	346.15	**1,500.00**	**18,000**
8.75	**350.00**	1,516.67	18,200
8.798	351.92	1,525.00	18,300
8.942	357.69	**1,550.00**	18,600
9.087	363.46	**1,575.00**	18,900
9.135	365.38	1,583.33	**19,000**
9.231	369.23	**1,600.00**	19,200
9.375	375.00	**1,625.00**	19,500
9.519	380.77	**1,650.00**	19,800
9.615	384.62	1,666.67	**20,000**
9.663	386.54	**1,675.00**	20,100
9.808	392.31	**1,700.00**	20,400
9.952	398.08	**1,725.00**	20,700
10.00	**400.00**	1,733.33	20,800
10.096	403.85	**1,750.00**	**21,000**
10.24	409.62	**1,775.00**	21,300
10.385	415.38	**1,800.00**	21,600
10.529	421.15	**1,825.00**	21,900
10.577	423.08	1,833.33	**22,000**
10.625	**425.00**	1,841.67	22,100
10.673	426.92	**1,850.00**	22,200
10.817	432.69	**1,875.00**	22,500
10.962	438.46	**1,900.00**	22,800
11.058	442.31	1,916.67	**23,000**
11.106	444.23	**1,925.00**	23,100
11.25	**450.00**	**1,950.00**	23,400
11.394	455.77	**1,975.00**	23,700
11.538	461.54	**2,000.00**	24,000
11.875	**475.00**	2,058.33	24,700
12.019	480.77	2,083.33	**25,000**
12.115	484.62	2,100.00	25,200
12.50	**500.00**	2,166.67	**26,000**
12.692	507.69	2,200.00	26,400
12.981	519.23	2,250.00	**27,000**
13.125	525.00	2,275.00	27,300
13.269	530.77	**2,300.00**	27,600
13.46	538.46	2,333.33	**28,000**
13.75	**550.00**	2,383.33	28,600
13.846	553.85	**2,400.00**	28,800
13.942	557.69	2,416.67	**29,000**
14.375	575.00	2,491.67	29,900
14.423	576.92	2,500.00	**30,000**
14.904	596.15	2,583.33	**31,000**
15.00	600.00	2,600.00	31,200
15.385	615.38	2,666.67	32,000
15.577	623.08	2,700.00	32,400
15.625	625.00	2,708.33	32,500
15.865	[illegible]	2,750.00	33,000

This conversion table makes it easy to express any given compensation in terms of hourly, weekly, monthly, or yearly rates and to go [illegible] of these bases to another. The **bold face figures** in the table are the base figures.

Hourly rates converted to weekly, monthly, and annual rates at $.01 per hour intervals from $1.60 to $3.00 per hour [illegible] $.05 [illegible] $5.00 per hour. **Weekly rates** (40 hours) converted to hourly, monthly, and annual rates at $1.00 per week intervals from $64 to [illegible] at $2.00 and $5.00 intervals from $100 to $200 per week; and at $25.00 intervals from $200 to $625 per week. **Monthly rates** [illegible] 173-1/3 hours) converted to hourly, weekly, and annual rates at $5.00 per month intervals from $277 to $530 per month; at $10.00 and $[illegible] intervals from $530 to $900 per month; at $25.00 per month intervals from $900 to $2,000 per month; and at $100.00 per month intervals [illegible] $2,700 per month. **Yearly rates** (12 months, 52 weeks, or 2,080 hours) converted to hourly, weekly, and monthly rates at [illegible] from $3,400 to $10,500 per year; and at $1,000 per year intervals from $11,000 to $33,000 per year.

APPENDIX E

STYLE NOTES FOR COMPARE QUESTIONS AND OVERVIEW

1. Conserving Characters:

   If necessary to conserve characters, delete articles "a" and "the" and personal pronouns "him," "his," "her." Use "&" for "and" only when necessary. (Computer operator may sometimes substitute ampersands if necessary to fit on frame.) Use abbreviations only when necessary.

2. Capitalization:

   Capitalize "State" only if referring to a particular state mentioned previously.
   Capitalize "Federal" only in Federal government.
   Write "Associate degree,"
   "bachelor's degree," and
   "master's degree."
   Use "doctorate" instead of "Ph.D."
   Do not capitalize civil service exam.
   Do capitalize "Armed Forces."

3. Punctuation:

   The word "free lance" is always hyphenated when used as an adjective; never when used as a noun.

LETTER SUMMARIZING EFFORTS TO ELIMINATE SEXIST LANGUAGE FROM SIGI

EDUCATIONAL TESTING SERVICE PRINCETON, N.J. 08540

Area Code 609
921-9000
CABLE-EDUCTESTSVC

Developmental Research Division

December 31, 1973

Dr. JoAnn E. Harris
Willowbrook High School
1250 South Ardmore
Villa Park, IL 60181

Dear Dr. Harris:

Martin Katz has asked me to answer your letter regarding sex bias in SIGI. I have gone through the script and have drawn upon the experiences of the SIGI staff to compile this response. It is divided into the categories which you have specified.

I. The Interactive Dialogue.

A. The Values Game.

We have just revised some aspects of the Values Game. Prior to these revisions, the characterizations created an exclusively male atmosphere. Situations involved a rich "uncle" or a warmhearted friend who could name "his" replacement. We went through each of the situations, alternately substituting female pronouns, aunts, and sisters. We now have a half-male and half-female universe, with respect to the Values Game.

B. The Introduction System.

When "signing on" each student is requested to identify her/himself. One of the frames reads:

"Press one of the numbers (1-3) to record your sex.
(1) Male
(2) Female
(3) Rather not say"

Except in the Prediction System (see number four below) this is purely for identification purposes.

C. The Compare System.

"How many women?" is one of 27 questions about an occupation for which a student may request an answer. Students are not forced to see the answer to this question. It is for information purposes only and no conclusions are drawn or offered by SIGI. Typical responses are:

Question: How many women?
Answer: 35% women. (Newspaper Reporter)
Less than 2% women.
Mostly men; number of women small but growing. (Architectural Technician and Draftsman)
Very few women; the heavy lifting may discourage women. (Airconditioning, Refrigeration, and Heating Mechanic)

For most occupations the answer is given as "x% women."

D. The Planning System.

Originally the Planning System gave the impression that college counseling and advisory staffs were exclusively male.

> "Ask your financial aid officer about them. He can tell you..."
> "Make sure you discuss your problem with him."
> "He will help you."

These and other sentences have been revised to read:

> "Ask your financial aid officer who will tell you..."
> "Make sure you discuss your program with your counselor."
> "Your counselor will help you."

II. Data Files.

We have recently completed a revision of all 119 occupations in SIGI. Definitions and descriptions were rewritten, salary information was updated, and, in the process, we attempted to delete any sex-based references in the occupational write-ups. A few technical occupations tended to have a male slant, containing only male pronouns and male descriptors. Other occupations were heavily slanted toward females. A good example of this was "Stewardess" (now titled "Flight Attendant," see number three below.)

> "Personal Qualifications:
> Should be attractive, poised, tactful, and resourceful young woman, aged 19-27, height 5'2" - 5'9", with pleasant speaking voice and good vision. Must usually be unmarried when hired, but may continue work after marriage."

This was altered to read:

> "Personal Qualifications:
> Should be attractive, poised, aged 19-27, have a pleasant speaking voice, good vision, and be in excellent health. Weight and height should be in proportion: men, from 5'3" to 6' and not over 180 lb., and women, from 5'3" to 6' and not over 155 lb.

Wherever the sense of the sentence and the interest of good writing style are served, all pronouns, male and female, have been deleted. This seemed to be the best solution in the absence of a singular pronoun suitable for both males and females.

No sex descriptors remain, except for a few weight and height specifications. SIGI, however, does not assume that someone 6' tall, weighing 220 pounds is necessarily male.

III. Occupational Titles.

A. Changed Titles.

The titles of thirteen occupations have recently been changed.

Former Title	New Title
Policeman	Police Officer
Stewardess	Flight Attendant
Insurance Salesman	Insurance Agent
Real Estate Salesman	Real Estate Agent
Securities Salesman	Securities Broker
Inhalation Therapist	Respiratory Therapist
Clergyman	Clergy
Instrument Repairman	Instrument Repair Technici
Manufacturer's Salesman	Manufacturer's Salesworker

APPENDIX F (cont.)

Former Title	New Title
Appliance Serviceman	Appliance Repair Technician
Business Machine Repairman	Business Machine Repair Tech.
Automobile Salesman	Automobile Salesworker

Inhalation Therapist was changed for non-sex-related reasons. All changes were fully researched and documented to insure that the new titles render the occupations as readily recognizable as did the old titles.

B. Unchanged Titles.
Three occupational titles linked by the suffix "man" to a male image have not been changed. We are unable to devise an appropriate, readily recognizable substitute for "Telephone Craftsman," "Nurserym Landscaper," and "Draftsman." **

C. Values Game.
The names of 15 mythical occupations in the Values Game revealed no sex linkage. The only offender, "Bucksman," has been changed to "Buckster."

IV. Computer Algorithms.
There remains only one sex-based difference in the computer algorithms. This is currently under revision. It occurs in the Prediction System when a student sees a display showing the probabilities that he/she will obtain a grade of A or B, C, or below C in a curriculum at her/his colle This is based on grades earned by previous students who resembled the student with respect to test scores and high school rank. The three curricula for which probabilities are given in the explanatory display are: Humanities and Social Science, Data Processing, and either Accounting or Nursing. If the student had earlier identified himself as "male," he will see Accounting as the third curricula. If the student has earlier recorded herself as "female," she will see Nursing as the third curricul If the student has earlier responded "Rather not say" he or she will see Nursing as the third curricula on the presumption that more females than males would decline to specify their sex.

This procedure had been instituted to ensure that each student would see predictions for at least one curriculum of interest to her or him which enrolls large numbers of the same sex as the student. It was presumed from enrollment data that more females would be interested in Nursing and that more males would be interested in Accounting.

As I have indicated, this is under revision; the three new curricula will not be sex-specific.

V. On-line Instruments and Questionnaires.
No sex-bias has been found to exist, or to have existed, in this area.

I apologize for the delay in responding, and hope that this has been of use to you.

Respectfully,
Karen B. Boyle
Karen Boyle
Research Assistant

KB:mb

** *Telephone Craftsman has since been changed to Telephone Craftsworker.*

APPENDIX G

RECOMMENDED READINGS FOR NEW RESEARCH ASSISTANTS

1. This handbook
2. Introductory material in the OOH
3. SIGI brochures
4. SIGI: Report of a Pilot Study Under Field Conditions, 1973, shelf

Before beginning work on new write-ups, the RA should have had extensive hands-on experience with SIGI and should also have an understanding of how the subsystems are interrelated and how the occupational information and ratings are used in LOCATE, COMPARE, PLANNING, and STRATEGY.

APPENDIX H

SOURCES FOR OCCUPATIONAL VALUE RATINGS

Ratings for four of the ten SIGI Values can in most instances be determined from hard data: Early Entry (Education), Income, Leisure, and Interest Field. Six Values, however, require a higher level of inference: Helping Others, Leadership, Prestige, Independence, Variety, and Security. For these areas of "soft data," after all relevant information is reviewed for each occupation, judgments are made about the level (1 to 4) into which the majority of the persons in this occupation would fit. At least two staff members go over each value rating as it is assigned, and if there is disagreement, more research and additional consultation are initiated.

There is one exception to the above and that is the value Prestige. Prestige ratings are based on the dissertation of Paul M. Siegel of the University of Michigan Population Studies Center. The dissertation is "Prestige in American Occupational Structure," University of Chicago, Department of Sociology, 1971. It was only necessary to establish points on Siegel's scale for separation of the four SIGI categories. Most SIGI occupations are ones which Siegel rated; others require composite ratings.

Among the sources of data for other judgments is the Dictionary of Occupational Titles which assigns numerical ratings to occupations for Independence, Variety, and Leadership. Leadership is also frequently mentioned in connection with supervisory duties in the Occupational Outlook Handbook and in the other career guides and monographs. Ratings on Variety can be derived from description of work activities.

For Helping Others, the rating levels are also derived largely from the definition and description of the occupation. A number of occupations that primarily involve service to the public are well known, e.g., Physician, Social Worker, and Teacher. Other occupations may offer opportunities for service if the worker is so motivated, but this may not be the primary function of the occupation. In some instances, consensual judgments by persons with broad knowledge of many occupations are needed to make the final decisions on these ratings.

Questioning knowledgeable persons in the field, such as directors of professional associations and teachers of the occupation, is another method of determining ratings for several of the SIGI values. The questions might be: (Concerning Variety) How many different problems and activities do members of this occupation work on in the course of a week, or a month, or a year? (Concerning Leadership): How many people do they usually direct? (Concerning Independence): How many decisions must a person in this occupation make on his own?

Ideally the SIGI staff would like to conduct its own surveys of selected samples of persons working in each field to determine the ratings for every SIGI value, but at present this is not feasible.

APPENDIX I.

HOW ARE OCCUPATIONS SELECTED FOR INCLUSION IN SIGI?

(Procedure Used Spring of 1976)

SIGI was designed for use by students at both two-year and four-year colleges. Consequently, most of the occupations in SIGI's data file require some college training. The amount ranges from a community college certificate or degree to a degree from a graduate or professional school. In addition, SIGI includes some occupations, like farmer and plumber, that do not require formal training, but for which preparatory programs are available in colleges, technical schools, or apprenticeships. Finally, there are also in SIGI some occupations for which post-secondary education is not appropriate, but which are entered by significant numbers of college students.

At present, SIGI includes only civilian occupations. The military tends to comprise a distinct occupational system of its own with its own occupational titles, specialties, opportunities for advancement, salaries, and educational facilities.

A small sample of two-year and four-year colleges was polled by the ETS staff to help set priorities for occupations to be included in SIGI. In addition, occupational titles from the Occupational Outlook Handbook, the Dictionary of Occupational Titles, the California Occupational Guide Series, surveys of occupations entered by college students, and other sources were considered for inclusion in SIGI. Potential occupations were excluded for a number of reasons, as follows:

1. The occupation is of more interest to the high school population than to the two-year or four-year college population. (Most colleges polled were not interested in such occupations as electronics assembler and truck driver.)

2. The occupational title is so specific or the occupation so specialized that the number of workers in the occupation is small (e.g., museum curator, air pollution technician, veterinary hospital attendant). In some cases, this type of occupation is subsumed under a more general occupational title in SIGI (e.g., rodman is covered under surveyor; electronics engineer under electrical engineer).

3. The occupation has the same values profile as a present or proposed SIGI occupation and is best handled as part of the broader category (e.g., personnel manager under business administrator; civil engineering aide under engineering technician).

4. The occupation is highly visible and requires specialized talents which must be developed early in life. Decisions with respect to such an occupation are usually made long before entrance to college and students are not likely to discover it or decide to prepare for it because of interaction with SIGI (e.g., professional athlete).

5. The occupational title is too broad to be useful, but the related suboccupations are too narrow (e.g., retail salesworker/department store clerk; college student personnel worker/registrar).

6. The occupation is not an "entry level" occupation. Entry into it is the result of experience in another occupation that is included in SIGI (e.g., judge, entered from lawyer; politician or fund raiser, entered from various occupations).

7. The occupation is a specialty of a more general occupation in SIGI for which specialized preparation takes place in graduate school (e.g., various types of physicians, psychologists, lawyers, oceanographers, and college teachers*). Specialties of some occupations (such as engineer and secondary school teacher) are included in SIGI because the specialized training usually occurs at the undergraduate rather than the graduate level. The number of specialties having identical value profiles must be restricted, however, if they are to appear in the LOCATE system.**

8. The outlook for the occupation is too uncertain to warrant inclusion now, although it may be reconsidered later (e.g., nuclear technician and nuclear engineer).

9. The title refers to a job in a given establishment rather than to an occupation (e.g., financial analyst, administrative assistant).

10. Valid information about the occupation is so difficult to obtain that costs outweigh the benefits.

---

* College teacher occupations are included as a variety of the occupation associated with the discipline to be taught (professor of political science under political scientist, etc.), since the college setting represents only one possible place of employment for these professionals.

**The purpose of LOCATE is defeated if the student has to grapple with long and unmanageable lists. If more than 20 occupations fit a set of values/specifications in LOCATE, students must raise their standards in order to reduce the list. Upon doing so, they may eliminate all the specialties which are similarly rated. The result is that a long list of such specialties would never appear at all in LOCATE. The number of occupations that have identical values ratings should therefore be kept below 20.

APPENDIX C

PLANNING SYSTEM MANUAL

SIGI

PLANNING SYSTEM MANUAL

by
Warren Chapman

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INTRODUCTION

The System of Interactive Guidance and Information (SIGI) is a computer-based guidance system designed to help community college students make informed and rational career decisions. The student, seated at a cathode ray tube (CRT) terminal, interacts with a computer in such a way as to examine and explore his values, obtain and use relevant information, interpret predictive data, and formulate plans.

The portions of the interaction that concern predictive data and the formulation of plans are different at each college because the colleges differ in their curricula, student populations, grading practices, and educational philosophy. Therefore, when a college becomes a SIGI user, it undertakes to supply the data that adapt the Prediction and Planning systems to the unique circumstances of the college. In effect, the college tailors SIGI to the college's unique measurements.

This manual explains how the tailoring is done with respect to the Planning system. It has been written with the expectation that whoever prepares the local Planning system will not know (and, perhaps, not care) how the computer works. Therefore, no knowledge of computers is required. Nor is extensive occupational information required. Although the person preparing the system will be consulting many college catalogs and may want to examine other sources as well, all the necessary occupational information for a satisfactory Planning system is right in this manual.

What is required is close familiarity with the curricula of the college, its degree and transfer requirements, and the practical features of its educational milieu--the ease of transferring, the role of the Associate degree in transferring or getting a job, the aspirations of the students, the institutions they transfer to, and the numerous other local conditions that do not appear in the college catalog but that the "insider" knows about.

Also required is the ability to make discriminating judgments as to which of several curricula is the best preparation for an occupation, or which of several courses best meets a lower division requirement for transfer, a distribution requirement for the Associate degree, and a skill requirement for the occupation, all at the same time. The manual gives all the useful suggestions it can, and fortunately the design of the system is flexible enough to admit many different solutions to problems. But nothing can take the place of knowledge of the college and discernment in applying it.

I want to acknowledge my debt to Ms. Gretchen Bullock and Ms. Karen Boyle for the monumental work they did in assembling Appendix A, the heart of the manual; and my debt to Ms. Madeline Bara, who prepared the figures and typed the manuscript.

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CHAPTER I

SEQUENCE OF DISPLAYS IN THE PLANNING SYSTEM

Two Phases of Interaction

Interaction in the Planning system is in two phases. In the first, the student considers an occupation in light of the amount of time and difficulty of work involved in preparing for it. The interaction in this phase depends upon the educational requirements for entry into the occupation rather than upon the resources of the local college. Therefore, this part of the Planning system is the same for all colleges that use SIGI.

If the student decides to go ahead with his occupation, he enters phase two. This phase includes a sequence of displays giving quite detailed suggestions with respect to the community college work the student must undertake to begin the preparation. Since community colleges differ in their curricula, the content of many of these phase two displays must be determined by the local college.

Displays for Phase Two

Figures 1-10 at the end of this chapter illustrate most of the displays that the student may see in the phase two sequence, with some of the connective tissue cut out. The portions of the displays that are to be prepared by the local college are identified in marginal notes. Besides the displays specified in the figures, the local college must prepare a display for a General Studies program. The college may also wish to edit the text of certain other Planning displays, such as those concerned with prerequisites for admission into local curricula, so that they accord with the philosophy of the college. These displays, as well as the displays for General Studies, will be discussed separately.

This is the sequence of displays for phase two:

1. An overview sketching the steps required for entry into the selected occupation from the first year of college to the completion of preparation. Figure 1 reproduces the overview for meteorologist.
2. A display listing the curricular options at the student's college. If more than one curriculum can lead to entry into an occupation, the student must choose one. (See figure 2A.) If only one curriculum leads to the occupation, a slightly different display is used (figure 2B).
3. A display showing the high school prerequisites for admission into the chosen curriculum (figure 3).
4. The program of study (course listings) at the local community college for the selected curriculum (figure 4).

5. A statement about requirements for the Associate degree and an admonition about checking the requirements for transfer (figure 5).

6. When appropriate, a list of transfer colleges and graduate schools where preparation may be completed (figure 6).

7. A display showing the student how to determine whether or not he can enroll in the new program without losing credit for courses already taken for another program (figure 7). Students who have not yet been admitted into the college do not see this display.

8. If the local college does not offer a curriculum appropriate for the selected occupation, the third display in this sequence (high school prerequisites) is replaced by a special display telling the student where he can get the necessary preparation (figure 8). That display may be followed by a program-of-study display and a list of follow-on colleges if such displays could add information useful to the student. Generally, however, the special display contains all the necessary information.

9. As an option, the student may request a series of displays showing the main Federal, State, and local sources of financial aid. The last of these contains information about local sources and gives the title and location of the office of the local financial aid officer (figure 9).

10. If the student is interested in enrolling in the program he has just seen, he sees a display telling him whom to see at the local college in order to register for it (figure 10).

Input From the Local College

Items the local college must prepare. As the marginal notes on the figures indicate, the local college *must* prepare the following items in the sequence:

1. The names of the programs of study inserted in the displays illustrated by figures 2A and 2B. (See the figures and pages 17-19.)

2. The lists of high school prerequisites inserted into the display illustrated by figure 3. (See the display and page 22.)

3. The programs of study displays. (See figure 4 and pages 20-21.)

4. The lists of follow-on colleges. (See figure 6 and pages 23-24.)

5. The special displays for occupations that cannot be prepared for at the local college. (See figure 8 and pages 24-25.)

6. A display showing the General Studies curriculum. (See figure 16 and page 25.)

7. A sequence of five displays listing the sources of financial aid available to students. (See figure 9 and pages 28-29.)

8. A display telling the student how to enroll in a program at the local college. (See figure 10 and pages 29-30.)

Items the college may alter or edit. The text of the following Planning system displays may be edited if the policies of the local college are in conflict with the content of the displays as they appear in the figures. These changes must be confined to textual alterations; no changes are possible that require changes in the computer program.

1. The framework in which the list of high school prerequisites is inserted. (See figure 3 and page 30.)

2. The entire content of the display discussing the requirements for the Associate degree and for transfer. (See figure 5 and page 30.)

3. The entire content of the display telling the student how to reconcile old and new programs. (See figure 7 and page 30.)

Because the computer is something of a tyrant in what it will accept, there are naturally restrictions on the way the displays must be formatted. But if they are carefully prepared, the result will be a Planning system that is tailored to the particular philosophy of the local college and its course offerings.

Plan of This Manual

The next chapter discusses the rationale of the Planning system. Then subsequent chapters explain how the displays should be prepared in the order of preparation. Finally, four appendixes are designed to help the person preparing the local Planning system. Appendix A contains occupational information that will simplify the selection of the local program of study for each occupation. Appendix B summarizes the formatting of each kind of display. Appendix C summarizes the step-by-step procedures that are fully described in the body of the manual. And appendix D shows what the completed Planning system will look like when it is ready to be sent to ETS.

Entire display prepared by SIGI

161 Meteorologist

1. Enroll in physics or engineering science program in community college.

2. Check catalogs of 4-year schools offering a bachelor's degree in meteorology or in physics with several courses in meteorology. Include in community college program courses they require for transfer.

3. Complete the Associate degree, transfer to a 4-year school, and complete the bachelor's degree in meteorology, or in physics with an emphasis in meteorology.

4. While in college, try to get summer employment with the Environmental Science Services Administration, which includes the Weather Bureau, or with private weather consulting firms.

5. Graduate training very strongly recommended and may be required for all but beginning positions. Some agencies will hire a meteorologist with only a bachelor's degree and allow him or her to get graduate training while employed.

For a copy press PRINT; otherwise press NEXT.

FIGURE 1

First in the sequence of displays showing the actual educational steps a would-be meteorologist should take to prepare for that occupation. The display is the same for all community colleges and requires no additional input from the local SIGI user.

Inserted by computer

161 Meteorologist

Programs selected by local college

(1) Physics
(2) Engineering Science

Prepared by SIGI

You could take more than one program of study to prepare for this occupation. The programs are listed above. Each one is different.

Select the program that interests you most. You will then see a series of displays showing you the high school courses you need to get into the program, and the courses you will be taking in community college.

If the program is not offered at your community college, you will see a list of schools in your area that do offer it.

Press the number of the program you want to see.

FIGURE 2A

Second display in the Planning sequence. The display is used if more than one program of study will lead to the occupation, as is true of meteorologist at this college. The college identifies and names the programs of study it considers appropriate (see figure 11). As many as seven different programs may be specified for an occupation. The local information is inserted into a text that is the same for all SIGI users.

Inserted by computer

113 Broadcast Technician

Program selected by local college

Electronics Technology

Prepared by SIGI

This is the program of study that is recommended for your occupation.

In a moment you will see a series of displays showing you the high school courses you need to get into the program, and the courses you will be taking in community college.

If the program is not offered at your community college, you will see a list of schools in your area that do offer it.

Press NEXT.

FIGURE 2B

This display is used when only one program of study fits the occupation. The computer inserts the name of the student's occupation in line 1. The college identifies the program of study it considers appropriate (see figure 11), and the computer inserts its name into a text that is the same for all SIGI users.

Inserted by computer

161 Meteorologist

Master frame

HIGH SCHOOL PREREQUISITES FOR THIS PROGRAM

Prepared by local college

High school diploma or equivalent
One year of science (biology, chemistry, or physics)
Three years of math, including second-year algebra and trigonometry
Recommended: two years of foreign language
Students who lack the necessary prerequisites may major in this program with a special program that meets the approval of the department chairman.

Master frame

If you have not completed the prerequisites, you may not be allowed to take some of the courses in your program of study. You will have to take lower level courses first, and this will put you behind schedule. You can:

1. Get back on schedule by making up work in summer school.
2. Take longer to graduate.
3. Get back on schedule by taking extra courses during a semester.

Each case is different. SEE YOUR COLLEGE COUNSELOR OR COLLEGE ADVISER.

You will want a copy of this information. Press PRINT.

FIGURE 3

Third in the sequence. What looks like a single display is actually assembled from three separate elements: (1) The name of the student's occupation, inserted by the computer in line 1; (2) a master frame consisting of "HIGH SCHOOL PREREQUISITES FOR THIS PROGRAM" and all of the text below the list of prerequisites; and (3) the list of prerequisites itself. The master frame (element 2) is always the same, but the list of prerequisites depends on the program recommended for the occupation. The prerequisites in the figure are the ones the student would see if he had selected the physics option in figure 2A. The local college prepares the lists of prerequisites. It may use the master frame shown in the figure or prepare one of its own.

Inserted by computer

Entire display prepared by local college

```
                        161 Meteorologist

A suggested PHYSICS program includes:                                    38
                                                                          1
FIRST SEMESTER                      SECOND SEMESTER                      48
EG 101 Language & Lit. I            EG 102 Language & Lit. II            58
MA 111 Math Analysis I              MA 112 Math Analysis II              56
CH 101 Gen. Chemistry I             CH 102 Gen. Chem. & Qualitative Analysis  72
PH 103 Univ. Physics I              PH 104 Univ. Physics II              56
PE 110 Health & Phys. E.            PH 104 Univ. Physics II              52
       Foreign Language                                                  24
                                                                          1
THIRD SEMESTER                      FOURTH SEMESTER                      48
MA 211 Math Analysis III            MA 212 Math Analysis IV              56
PH 213 Univ. Physics III            PH 214 Univ. Physics IV              56
PS 131 Colloq. in Phys. Sci. I      PS 132 Colloq. in Phys. Sci. II      64
       English or soc. sci.                Language or hum. elect.       63
       Language or hum elect.              Soc. sci. elect.              56
       Soc. sci elect.                                                   24
                                                                          1
For a copy press PRINT.                                                  24
                                                                        ---
                                                                        798
```

FIGURE 4

Fourth in the sequence, the program of study offered at the local college. The entire display, except for the name of the occupation, is constructed by the local college. The display may not exceed 23 lines (not counting the name of the occupation inserted in line 1 by the computer), and the total number of characters may not exceed 1,000. The figures on the right, which are not displayed, show the number of characters in the line.

Entire display prepared by SIGI

```
              REQUIREMENTS FOR THE ASSOCIATE DEGREE

     If you take the courses exactly as listed on the previous display, you will
meet the requirements for the Associate degree at your community college.

     If you make substitutions, be sure that you don't accidentally remove a
required course.  Check the graduation requirements in your college catalog and
get the approval of your college adviser.


                    REQUIREMENTS FOR TRANSFER

     Transfer students must have their community college work evaluated by the
4-year college they apply to.  The 4-year colleges are often inconsistent.
The program suggested in the previous display provides the best chance of get-
ting accepted for transfer, but it may not work in all cases.

     ASK FOR ADVICE FROM THE 4-YEAR COLLEGE THAT YOU WANT TO ATTEND.


     Press NEXT.
```

FIGURE 5

Fifth in the sequence. All students at the college see this display.

Inserted by computer

Entire display prepared by local college

```
                          161 Meteorologist

Nearly all 4-year colleges offer a bachelor's in physics and many physics        74
programs include at least one course in meteorology.                              53

Listed below are colleges nearest you which offer a bachelor's in meteorology.   79
Those with stars also offer graduate degrees in meteorology.                      61
                                                                                   1
NEW JERSEY                NEW YORK           PENNSYLVANIA                         56
Rutgers (N. Brunswick)*   New York Univ.*    Pa. State Univ.*                     60
Livingston College                 SUNY-Maritime C.                               42
                                                                                   1
The Johns Hopkins University in Maryland offers a master's and a doctorate       75
(but not a bachelor's) in meteorology.                                            39
                                                                                   1
WARNING: List not necessarily complete.  Check college catalogs located in       75
         your school library or counselor's office.                               52
                                                                                   1
For a copy press PRINT.                                                           24
                                                                                 695
```

FIGURE 6

Sixth in the sequence, the list of follow-on colleges where preparation is completed for entry into the occupation. Except for the name of the occupation in line one, the entire display is constructed by the local college. The display may not exceed 23 lines (not counting line one), and the total number of characters may not exceed 1,000. The numbers on the right, which are not displayed, show the number of characters in the line. There is, of course, no list when the preparation for an occupation does not require transfer. The computer simply skips to the next command in the program.

Entire display prepared by SIGI

Will you lose credits if you switch to this new program? To find out, follow these steps:

1. After signing off, look in your new program for courses you have already taken.
2. Cross off your new program any courses you have already taken.
3. Can you SUBSTITUTE a math course you have already taken for a math course in the new program? If you think you can, place a question mark (?) beside the math course in the new program.
4. Follow step 3 for courses in social science, science, and English.
5. Does your new program have free electives? If so, courses you have already taken may fit in there. Place two question marks (??) beside such courses in the new program.
6. Now take your new program to your counselor, who will know what the question marks mean and will help you get into the new program with the least loss of credit.

You will want a copy of this display. Press PRINT.

FIGURE 7

Seventh in the sequence. This display is presented only to students who are currently enrolled in the local college or have completed some coursework.

Inserted by computer

Entire display prepared by local college

218 Wastewater Treatment Operator	
Mercer County Community College does not offer WASTEWATER TREATMENT. You can	78
get training at the New Jersey community colleges named below:	63
	1
2-year Associate degree program in Environmental Health Science Technology (in-	80
cluding wastewater treatment):	31
	1
Middlesex County College, Edison	38
	1
Nondegree program in Advanced Wastewater Treatment Operations offered at:	79
	1
Morris County College, Dover Ocean County College, Toms River	73
Middlesex County College, Edison	38
	1
You can take the required introductory course at a vocational-technical high	77
school near these colleges.	28
Your counselor can tell you how to enroll in these programs without paying	75
extra tuition.	15
	1
For a copy press PRINT.	24
	706

FIGURE 8

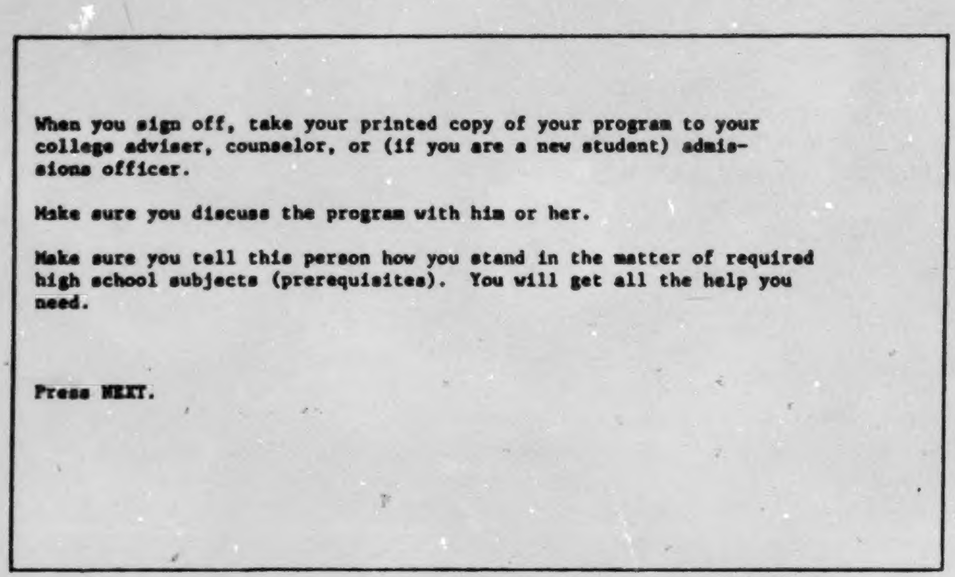
A special display replaces the Program of Study/Prerequisites/Follow-on Colleges sequence in those cases where the local college does not offer a program that prepares students for entry into the selected occupation. The computer inserts the name of the occupation in the first line of the display. The remainder of the display is prepared by the local college. It cannot exceed 23 lines (not counting the first line), and the total number of characters cannot exceed 1,000. The numbers on the right, which are not displayed, show the number of characters in the line.

Entire display prepared by local college

	LOCAL	43
		1
College-Sponsored	MCCC provides part-time jobs up to 15/hours/week. This is a	80
Employment	different program from the work-study described earlier.	76
		1
Grants-in-Aid	Offered by MCCC to students with outstanding talent in cer-	79
	tain areas, such as music, art, writing, athletics, stu-	78
	dent government. They pay tuition, fees, & textbooks.	74
		1
Scholarships	Several are available in varying amounts. Two of the cover	80
	full tuition.	33
		1
The title of the financial aid officer at Mercer County Community College		79
is Coordinator of Financial Aid. See him or her.		50
		1
The Coordinator's office is in the Student Personnel Services Office.		75
		1
		1
For a copy press PRINT; otherwise press NEXT.		46
		800

FIGURE 9

The student has the option of seeing a sequence of five displays listing the Federal, State, and local sources of financial aid. They are all prepared by the local college. The figure illustrates the last in the sequence. The displays may not exceed 24 lines. The display shown in the figure may not exceed 1,000 characters, but some of the others in the sequence may be longer. The numbers on the right, which are not displayed, show the number of characters in a line.



When you sign off, take your printed copy of your program to your college adviser, counselor, or (if you are a new student) admissions officer.

Make sure you discuss the program with him or her.

Make sure you tell this person how you stand in the matter of required high school subjects (prerequisites). You will get all the help you need.

Press NEXT.

Wording may be changed to fit local conditions

FIGURE 10

This display is presented only to students who have expressed an interest in pursuing the occupation they selected for planning. If absolutely necessary, the wording in the display could be changed to fit the practices of the local college.

CHAPTER II

HOW THE PLANNING SYSTEM WORKS

This manual explains the step-by-step procedures for building a Planning system that suits the philosophy and resources of the local college. Although the system may seem complicated at first sight, the steps themselves are really quite simple if taken one at a time. Nevertheless, the person constructing the displays will find the task easier if he or she understands how the system works. No one likes the feeling of blindly following a recipe in a cookbook with no notion of how the ingredients combine into a finished product.

This brief chapter tells how the computer manages to select the right set of prerequisites and the right program at the right time for the occupation that the student is interested in.

Layout of the Local Information

The secret is the way the information is stored in the computer memory. Each of the four classes of local information (high school prerequisites, programs of study, list of follow-on colleges, and special displays) is stored serially in a separate compartment of memory. This means that in order to select any particular program of study, for example, all the computer need do is locate the first program and then count down the list until it comes to the program it seeks. All that is required is that there be a first program whose location in memory is known, and that there be no gaps in the numbering sequence. Identifying any particular item for display is essentially a counting operation.

Indexing the Displays

This method of selecting a display requires an index that the computer can consult to see how far down the list it should count. A portion of the index for Mercer County Community College is shown in figure 11. The index is prepared by the local college at the same time as the Planning system displays are constructed.

The way the index operates may be inferred from figure 11. Suppose the student is interested in occupation #161, meteorologist. After the phase one interaction, the computer displays the overview (figure 1) for meteorologist. It then consults the index and notes that there is more than one route to the occupation: the physics program or the engineering science program. It therefore selects the display shown in figure 2A, inserting in it the names of the two programs as they appear in column 2 of figure 11. Suppose the student chooses the first option, physics. The computer again consults the index and notes that for occupation #161, response 1, it should count down the Prerequisites list until it reaches item #7, the Programs list until it reaches item #93, and the Follow-on Colleges list until it reaches item #77. (If the student had asked for option 2, engineering science, the sequence would have been Prerequisites #14, Program #87, and Follow-on Colleges #77.) The computer now programs itself to insert the prescribed displays in the proper spots of the sequence.

Occupation number	Program name	Special number	Prereqs. number	Program number	Colleges number	Notes 1
101	Theater Arts	7		26	60	2
102	(1) Journalism, 2-yr.		3	49		3
	(2) Journalism, 4-yr.		3	50	2	
103	Electromechanical Engineering Tech.		13	118	90	
104	Accounting		8	1	35	
105	Airframe and Power Plant	9				2
106	(1) Electromechanical Engineering Tech.		12	6		4
	(2) Electronics Technology		12	115		
107	Architecture		11	36	6	
.	.	.	.	.	.	
113	Electronics Technology		12	116		5
.	.	.	.	.	.	
161*	(1) Physics		7	93	77	6
	(2) Engineering Science		14	87	77	
.	.	.	.	.	.	
184	Physics		7	93	21	7
.	.	.	.	.	.	
189 (2-yr.)	Telecommunications Production		1	80		8
189 (4-yr.)	Radio and Television Broadcasting		2	97	51	8
.	.	.	.	.	.	
345	General Studies		15	12		9

*Meteorologist

NOTES

1. The occupation number is from Appendix A. Program names are designated by the local college. The names are inserted in the displays reproduced in figure 2A (for occupations like numbers 102, 106, and 161) or figure 2B (for occupations like numbers 103 and 104, with only one path to entry.)
2. A "Special" display is constructed when the local college does not offer a suitable program for the occupation. See pages 19 and 24.
3. This occupation and numbers 106 and 161 are "multiple entry" occupations for this college. See pages 18 and 19.
4. No Follow-on Colleges display is necessary when preparation for the occupation can be completed at the local college. See page 23.
5. One Prerequisites display serves this occupation and both options of occupation #106. Only one Prerequisites display need be prepared. See page 22.
6. One Follow-on Colleges display serves both options. Only one display need be constructed. See page 24.
7. The Prerequisites and Programs displays that serve this occupation will also serve the physics option for occupation #161. Only one display of each kind need be constructed. See page 20.
8. A WICH occupation is treated as if it were two distinct occupations. See page 31.
9. In the Planning system, General Studies is treated as if it were an occupation. See pages 25-28.

FIGURE 11

A portion of the index table for one community college. See text, pages 14-31.

Most occupations do not offer planning options. If the student's occupation were #113 instead of #161, the student would see the display reproduced in figure 2B. His response of NEXT in this display would then generate the sequence of Prerequisites #12 and Program #116.

Implications

This method of separating the local displays from the main-line SIGI displays has several features of advantage to the local college.

1. Each college can have unique displays and a unique numbering system. This means that the colleges are independent of one another with respect to both the content of the local displays and the number of them. The fact that program #93 was at Mercer the physics curriculum for the career goal of meteorologist does not mean that program #93 at some other college must be associated with physics or meteorology. It could be any program for any occupation. Similarly, the Mercer sequence of Prerequisites #7, Program #93, and Follow-on Colleges #77 might be, say, #19, #106, and #32 at some other college. Also, meteorologist, which at Mercer could be prepared for adequately in either of two programs, might at some other college be served by only one program or, conceivably, by three or more.

2. Since the displays are stored consecutively, the number of each kind at any particular college is open-ended. At Mercer, 15 Special, 20 Prerequisites, 130 Program, and 96 Colleges displays served the 119 occupations then in SIGI. At some other college, there might be more or fewer of each class. New displays can simply be added to the end of each list as new occupations are introduced into the system or as new curricula are established at the college.

3. If a single display will serve more than one occupation, it is not necessary for the local college to prepare more than one display. For example, the Prerequisites for Electromechanical Engineering Technology happen to be word for word the same as those for Electronics Technology. Therefore no matter which option the student selects for occupation #106, he will see Prerequisites #12. Similarly, it is not necessary to prepare a set of Prerequisites for occupation #113 because those already prepared for #106 will do. The same principle holds for Programs and Colleges. If a Program will, without change, serve two different occupations, only one program need be prepared. The reader will note that one Follow-on Colleges display (#77) is sufficient for meteorologist, regardless of whether the student chooses physics or engineering science.

4. A Special display may or may not be followed by other displays. The reader may remember that a Special display appears when the local college does not have a program suitable for the occupation. With respect to occupation #101 (Actor/actress), the Program slot was filled by a display telling the student the kind of preparation he could expect to undertake at another institution, and he was also given a list of Follow-on Colleges. For occupation #105, however, all useful information could be placed in the Special display, and no others were necessary.

5. Since the index numbers are the only clue the computer has in selecting the correct display, it is vital that the index table be free of error. The local college will have to check it carefully before turning it over to whoever inputs the information.

CHAPTER III

CONSTRUCTING THE DISPLAYS

ITEMS THE LOCAL COLLEGE MUST PREPARE

This chapter contains the step-by-step procedures for constructing the local Planning system.

Preparation

Before beginning work on the displays, make a file containing a 3 x 5 card for each occupation listed in Appendix A of the manual. Include a card with occupation number 345 for General Studies. The name and number of the occupation should appear at the top of the card. The rest of the information accumulates as the displays are constructed.

Figure 12 shows the card for meteorologist. All of the information that appears in the index table (figure 11) for meteorologist came from the card for that occupation, and in fact the index table is assembled from the cards after all the other work has been done.

The cards are invaluable to whoever constructs the Planning displays. It is also most useful to make a second card file, this time with a separate card for each curriculum offered at the local college. The card for the physics curriculum at Mercer College is shown in the lower portion of figure 12. These cards are most helpful in preventing duplication of effort, as explained later.

Begin With the Program of Study.

For each occupation, the program of study display (figure 4) should be prepared first. The other displays in the Planning sequence for that occupation--prerequisites, specials, and follow-on colleges--depend on the program of study.

Definition of "Program of Study."

By program of study we mean all the courses that a student free from academic deficiencies should take during his community college career (normally, two years) in order to prepare for a designated occupation. We will use the word program to mean the course listings that the student actually sees in the Program of Study display. We will use the word curriculum to mean course listings for a "major" as they appear in the college catalog. For example, with respect to the bottom illustration in figure 12, there are four Programs associated with the physics curriculum. The four differ from one another; yet they all satisfy the local requirements for a physics major.

161 Meteorologist

Name	Special	Program	Prereqs	Colleges
1. Physics		093	07	77
2. Engr. Sci.		087	14	77

Physics

Prog. No.	Occupation
093	178 Pilot; 141 Flt. Engr.; 184 Physicist, 161 meteorol.; 172 Oceanog.
094	214 Tech. Writer
095	213 Zoologist; 202 Schl. Couns
096	154 Librarian

FIGURE 12

Cards like those in the figure are useful in preparing input for the Planning system. Top figure: for each occupation a card is made containing the number and name of the occupation and the column headings. A number is assigned to each item of display and entered on the card as the item is constructed. A master list like that shown in Figure 11 can then be composed from the cards. Bottom figure: a card is also made for each curriculum at the college showing the names and numbers of the occupations it serves, and the numbers of the programs of study displays.

This definition has the following implications:

1. The content of the program of study is determined mainly by the requirements for entry into the occupation. That is, the program of study is, in most cases, more than the mere catalog listing of some curriculum or other. It is a curriculum tailored specifically to an occupation. The program of study stands in the same relation to the occupation as (for example) a Dental Assisting curriculum stands in relation to the occupation Dental Assistant.

2. If preparation for the occupation cannot be completed at the community college, the program of study will consist of that portion of the total preparation that does take place in the community college. That is, if entry into the occupation requires a bachelor's degree or other specialized training, the program of study will consist of the community college work that qualifies the student for entry into the appropriate curriculum at the transfer institution.

3. The program of study does not necessarily qualify the student for an Associate degree. It is sometimes to the student's advantage to transfer to a specialized institution as quickly as possible or to enroll in a nondegree program or to take a specialized course instead of satisfying local distribution requirements.

4. The program of study will not include high school courses or remedial courses.

Selecting Programs of Study

Use of Appendix A. Appendix A contains information that may be used in identifying the local curriculum or curricula that offer the most advantageous path to entry into each occupation. The following information is provided for each occupation:

1. The name and identification number of each occupation. These are, of course, fixed and may not be changed by the local college.

2. The occupational overview (figure 1) showing the steps required for entry from the first year of college to the completion of preparation. The local college should select or design a program or programs that will take the student over the junior college segment of that journey.

3. The classification (PROF,/GRAD, etc.) of the occupation. These classifications are also fixed. They determine the nature of the interaction the student is exposed to in phase 1 of the Planning system. The classification is useful in determining whether a program should be transfer or not. PROF indicates that graduate study is mandatory for entry into the occupation. GRAD means that graduate study is highly recommended. BACH means that a bachelor's degree is mandatory. SHUD means that a bachelor's degree is highly recommended. WICH consists of those occupations, such as Registered Nurse or Flight Engineer, for which two mutually exclusive paths to entry exist, one involving a transfer program and the other a terminal program. TERM means that two years or less are required for preparation. All occupations classified PROF, GRAD, BACH, or SHUD, as well as the four-year alternatives for Registered Nurse, Flight Engineer, Radio/TV Announcer, Physician's Assistant, or any other WICH occupation that may be added to the system, should be treated as requiring transfer programs of study.

4. Names used by various two-year and four-year colleges for curricula which, in the eyes of the SIGI research staff, may provide adequate preparation for the occupation. Colleges are very independent in what they call their offerings. Business, Business Administration, Business Management, Business and Management, Business and Finance, etc. may or may not be different names for essentially the same body of courses at different colleges. There is little uniformity in nomenclature from college to college, and there is no way to tell what the content of the curriculum is without turning to the college catalogs. In Appendix A, we have collected the names that seem to be in common use, basing our judgment on the designation of curricula in Volume 3, Degrees Offered by Colleges and Subjects, of The College Blue Book, 14th Edition (New York: CCM Information Corporation, 1972). The list of curricula must obviously be used with great caution by whoever selects and prepares the programs of study, since what is important is not the name of the curriculum but the appropriateness of the courses in it. A name may or may not provide a clue as to content. The list is presented merely as a convenience to the person selecting the program, who may recognize in the list a name used by the local college. The list is also useful when one searches catalogs of other colleges to see what courses they recommend for lower division work or to assemble a list of follow-on colleges.

5. Subjects which are recommended as electives in the program of study. Again, this information must be used cautiously, since the selected local curriculum may not have room for the recommended courses, or inclusion of a course might change the curriculum so as to disqualify the student for transfer or for the Associate degree.

6. For many occupations, additional information that our research has uncovered and that is useful when the Program of study displays are prepared.

Choosing the program. Using the information in Appendix A and knowledge of the local offerings, identify the local curriculum or program that seems to offer the most advantageous path to entry into the occupation. The selection should be done by an experienced counselor or academic adviser. The following principles, which were derived from our experience, may be helpful.

1. If the occupation happens to be one that is served by a local curriculum specifically designed for it, choose that curriculum. Examples are the Dental Assisting curriculum for the occupation dental assistant, the Radiologic Technology curriculum (under whatever name) for X-ray technician, the Architectural Technology curriculum for architectural technician, etc.

2. If the needs of preparation can be met by a curriculum or an adaptation of it, even though the curriculum was not designed specifically for the occupation, choose that curriculum. Examples are the occupation broadcast technician, for which the Electronics Technology curriculum seems like a logical choice; the occupation insurance agent, for which the Business Administration curriculum seems reasonable; the occupation surveyor, for which Civil Engineering Technology is probably best.

Many occupations come under this principle, and obviously some nice judgments have to be made about what is best for the student. This is especially true of such occupations as flight attendant, business machine repair technician, appliance repair technician, and many others, for which preparation takes place on the job or in employer-operated schools. There is no compelling reason that a person has to go to junior college at all if his only goal is to prepare for these occupations.

We make two assumptions with regard to this situation. First, we assume that the student's presence at a terminal on a community college campus indicates that he does have other goals in mind than mere preparation for a specific occupation. Second, we assume that most educational experience is advantageous to a person, even though its tangible benefits may be obscure. Therefore, we recommend a corollary to principle 2: select a curriculum that will lead to an Associate degree, provided that pursuing the curriculum does not actually interfere with preparation for the occupation.

3. If the occupation is classified PROF, GRAD, BACH, or SHUD, or is the four-year version of one of the WICH occupations, such as registered nurse or radio/TV announcer, choose a transfer curriculum. A minimum of a bachelor's degree is a condition for entry into all of these except the SHUD occupations, for which it is highly recommended.

In selecting the community college curriculum, begin by identifying the four-year college (or graduate school) major that prepares for the occupation; then work backward to identify the local curriculum that will transfer into that major. In looking at the four-year college majors, begin with the catalog of the college that the student is most likely to transfer to (usually, the nearest State college). Make sure that the college really offers a major in the required field, rather than a course or two. For example, if one were looking for a Statistics major for the occupations statistician, actuary, or market researcher, one would find that nearly all colleges offer courses in statistics, but not so many offer a major in that field.

It is not always easy to identify the best four-year major because opinions differ as to the best way to prepare for some occupations (e.g., systems analyst), colleges differ in how they name their curricula, and they differ in the courses they require for the curricula.

4. If more than one curriculum will lead to the occupation (e.g., meteorologist), list all relevant curricula (up to seven) in order to allow the student as much freedom as possible.

If more than one program of study can lead to an occupation, the occupation is called "multiple entry" in this manual. There are four situations resulting in multiple entry.

a) The only requirement for entry is a bachelor's degree in any field. Examples are airline pilot and the four-year version of flight engineer. The only practical way to accumulate enough flight time to qualify for these occupations is through one of the Armed Services. A bachelor's degree in any field is required for acceptance into a flying program. Since the field makes no difference, seven options--the maximum possible on SIGI--are listed for these occupations. In selecting a program, the local college need only make sure that each of the seven will transfer.

b) Several different programs will prepare for entry, and there is no reason to compel the student to take one over the others. An example is meteorologist, for which either a Physics or an Engineering Science curriculum at Mercer College would transfer to the proper major at a four-year college.

c) The occupation breaks down into several different specialties, each requiring different preparation. Examples are lawyer(patent attorney and general), librarian (science and general), or technical writer (the various branches of science or engineering). It is necessary to identify the specialties and select a program for each one. When the specialization takes place in graduate school but not before, the occupation is not multiple entry. For example, in SIGI physician is not multiple entry, since the premedicine curriculum is the same for all students regardless of their eventual specialty.

d) The occupation is classified as SHUD, and it is impossible to devise a program of study that will simultaneously be acceptable for transfer and adequately prepare for entry into the occupation without transfer. In such a case, the occupation can be designated as multiple entry, with one option becoming the transfer path and the other the two-year path.

5. If the occupation requires specific training which the local college cannot provide, flag the operation as one that requires a Special display. For example, if the local college does not have a specially designed program in wastewater treatment, it should not try to adapt an existing technology curriculum in the hope that the student will thereby become qualified as a wastewater treatment operator. Also, as another example, entry into certain aircraft occupations requires completion of a program certified by the Federal Aviation Administration. Although the local college may have a curriculum that seems equivalent, do not recommend it to the student bent on an aircraft occupation unless the curriculum has FAA certification. Instead, locate institutions that do qualify the student for entry into the occupation, and make a Special display telling the student about them.

Entering the name of the program. As each program is identified, enter its name on the card for the occupation which it serves. Ordinarily, the name of the program is the same as the name of the curriculum from which it was adapted. For example, at Mercer College, all four variations of the basic physics curriculum were called "physics." The name will be inserted in the display illustrated in figures 2A and 2B. Use the name that is used by the local college and that appears in the college catalog. The name should be the same as the name used in the Prediction system in the display that identifies the curricula for which the student may seek predictions.

Constructing the Program of Study Displays

Check programs already prepared. The first thing to do in preparing a Program of Study display is to check the programs already prepared that are based on the selected curriculum. This is the purpose of the card illustrated in the bottom portion of figure 12. For example, the person preparing the program display for the physics option for oceanographer first looked at the card for physics. He discovered that programs number 93, 94, 95, and 96 were all varieties of the physics curriculum. Examining them, he found that program number 93 was word for word suitable for oceanographer. He therefore added "172 oceanog." to the physics card, and on the card for oceanographer he entered 93 as the number of the program for the physics option. He did not have to make a duplicate of display number 93.

If none of the four physics programs had been exactly suitable, he would have had to prepare a new one for oceanographer. When he had assigned it a number, he would have entered the number on the physics card.

NOTE: It is only a coincidence that the program numbers on the physics card are consecutive.

It works best to construct at least the preliminary version of the Program display immediately after the program has been selected. Often considerable research has gone into the selection process, and the information will get lost or be forgotten if it is not used at once.

Preliminary version. In the preliminary version, concentrate on content. Formatting to fit the display parameters can come later. List the actual courses that the student should take in the selected program.

Generally, the program will consist of the catalog version of the chosen curriculum as modified to meet the needs of preparing for the occupation. The principles that go into selecting the most appropriate program go into selecting courses for the display:

1. Use the catalog listing without change whenever possible.

2. If a catalog curriculum must be tailored for the occupation, leave the students as many electives as possible. That is, if the catalog lists, say, a social science elective, recommend a specific social science course only if it helps prepare for the occupation or meets a requirement for transfer. For many occupations, Appendix A lists courses that seem desirable with respect to entry into the occupation.

3. If the occupation is classified PROF, GRAD, BACH, or SHUD, or is for the four-year version of a WICH occupation, the program should meet the requirements for transfer.

4. If the occupation is multiple entry, make out a program for each option.

Formatting the program display. Once the content of the display has been determined, the display must be formatted so that it will fit the restrictions of the hardware. Appendix B summarizes rules for formatting and contains suggestions for conserving space. Some additional comments may be helpful here.

The cathode ray tube screen can display 24 lines of 80 characters each. (A character is any letter, number, mark of punctuation, sign or symbol, or blank space occurring between the left margin of the screen and the last visible representation on the line. Thus "cat" consists of three characters, provided that the c is in the left-most position. "Cat and dog" consists of 11 characters--9 letters and two spaces, again provided that the c is placed as far left as possible.) The computer inserts in the first line the name and number of the occupation under consideration; the last character in each line must consist of an invisible end-of-line signal to the computer. Therefore the local college has at its disposal a single display consisting of a screen 79 characters wide by 23 lines long. This 79 x 23 space may not contain more than 1,000 characters. The last line of text (which is not necessarily the 24th line on the screen) must say, "For a copy press PRINT." If the program leads to a certificate rather than a degree, that fact should be mentioned."

The format of the display illustrated in figure 4 worked well for a college operating on the semester system. A college operating on a quarter or trimester system might find the format unsuitable because more headings are involved and more courses must be listed. If the local college finds it hard to live under the 23-line, 1,000 character restriction, it should experiment with a variety of formats. Appendix B will be helpful. The screen may be filled in any manner that the college chooses in order to get its message across, provided only that the restrictions enumerated above are respected.

Numbering the program display. When the display has been completed, assign it the next number in the Program of Study sequence. The first display will be number one, the second number two, and so on, with no upper limit (but be reasonable!) on the number of programs. Write the number on the display and enter the number on the card containing the name and number of the occupation served. (See figure 12.) It is also a good idea to enter the program number on the card illustrated in the bottom section of figure 12. The information on that card does not figure in the operation of SIGI, but it is useful to the local college.

Preventing errors in numbering. It is essential that there be no errors in the numbering of the displays. There MUST be a first display designated number 1, the other displays MUST follow consecutively with no gaps (that is, the situation must not occur where there is, for instance, a display number 7 and a display number 9, but no display number 8), and two different displays may not have the same number. Use a counter or prepare a master list of displays to keep track of the numbering.

Note that the number assigned to the display has no logical connection to the number of the occupation or to the way curricula are listed in the college catalog. One physics program might be number 15 and another physics program might be number 129. The easiest way is simply to number the displays in the order in which they are prepared.

Constructing the High School Prerequisites Displays

Definition of high school prerequisites. We use the term high school prerequisites very loosely to designate any set of conditions for entry into a program of study at the local college. These may be mandatory, such as attainment of some minimum score on a test, permission of the instructor, or completion of certain high school subjects; or they may be purely advisory and hence neither truly prerequisites nor related to high school experience. The local college should think of the prerequisites display as space available for a message concerning entry into a program of study. The prerequisites (as we use the term) will probably vary from program to program. The basic frame into which the various prerequisites are inserted, however, is fixed,although it may be reworded to suit the local college. (See figure 3.)

Dependence on program of study. The prerequisites for admission into a program depend on the program. Therefore do not prepare the prerequisites until the Program of Study display has been finished.

Formatting. Once the Program has been prepared, determine the prerequisites for entry into it. The prerequisites must fit into six lines of no more than 79 characters per line. With that restriction, the display may be formatted in any way that the college chooses.

Bear in mind that the prerequisites message and the basic frame into which it is inserted must form a harmonious whole. The display illustrated in figure 3 appears to the student as a single message, and he is not aware that part of the message is always the same and part changes from program to program.

One prerequisites display may serve many programs. Once the prerequisites have been determined for a program, check the prerequisites displays that have already been prepared for other programs to see if one of them will also serve the new program. Usually only a few sets of prerequisites displays are necessary; at Mercer College, 20 sets were enough for all 130 Programs of Study. If an existing prerequisites display will serve, enter its number on the card for the occupation being worked up. If the occupation is multiple entry, make sure that each set of prerequisites is associated with the correct Program of Study and with the correct option. Notice in the top portion of figure 12 that prerequisites number 7 is associated with option 1 (Physics) and with program number 93, not with program number 87, which has a different set of prerequisites. The prerequisites go with programs (which, in turn, go with options), not with occupations.

Numbering the prerequisites inserts. The prerequisites inserts are numbered in the same fashion as the Program of Study displays. That is, there must be a first display numbered 1, and the remaining displays follow consecutively with no gaps in the sequence and with no duplication of numbers. There is no upper limit to the number of the displays, but ordinarily there will not be many because the same set of prerequisites often serve many different programs. The number assigned to the prerequisites display is completely independent of the numbers assigned to the programs it goes with. As with the programs, the easiest way to number the displays is to call the first one prepared number one, the second number two, and so on.

When the display has been numbered, enter the number on the card for the occupation being processed. If the occupation is multiple entry, make sure that each prequisites number is associated with the Program of Study that it goes with.

Constructing the Follow-on Colleges Displays

Occupations for which displays are required. Follow-on Colleges displays are required whenever preparation for entry into the occupation continues after completion of the junior college program of study. Any occupation classified PROF, GRAD, BACH, or SHUD, as well as the four-year versions of WICH, will automatically require a Follow-on Colleges display because they involve transfer. Some other occupations may require a display, too, if there is some sort of specialized training program that the student has to go through when he or she has finished the community college segment of the preparation. At any rate, the local college may construct a display whenever it feels a need for one.

Relationship to program of study. The colleges named in the Follow-on Colleges display depend on what is required to complete the preparation begun with the program of study. That is, if an occupation is multiple entry, it may be necessary to prepare a different Colleges display for each program. For example, a would-be science librarian would be taking a science program at the transfer college, whereas a would-be general librarian would be taking a liberal arts program. The Colleges display for the science librarian would list institutions where the student could finish the undergraduate science, and the Colleges display for the general librarian would list institutions where the student would finish the liberal arts preparation. Both displays would also list graduate schools of library science.

Compiling the list. Colleges are selected on the basis of the majors they offer. If they have a major that prepares for the occupation, they are candidates for the list.

The best sources of information about major offerings are as follows:

1. College catalogs.

2. The College Blue Book: Degrees Offered by Colleges and Subjects, Volume 3 of The College Blue Book, 14th Edition (New York: CCM Information Corporation, 1972). Using this source, one can look up the name of any curriculum or major (e.g., Speech Correction, Experimental Psychology) and find, listed by state, the colleges and universities that offer the subject and the degrees they grant. The Blue Book uses the nomenclature of the colleges that supply the information, with the result that essentially the same curriculum may be called one thing at one college and something else at another. For example, preparation for speech pathologist/audiologist could be done in the Speech Therapy curriculum at one college and the Speech Pathology and Audiology curriculum at another. All likely names should be tried. Use the list of names of curricula in Appendix A. Once compiled, the list should be checked against the catalogs of the colleges themselves. Sometimes a college listed in the Blue Book as offering a degree program really offers only a course or two.

If an occupation is classified PROF or GRAD, the list must include graduate schools where preparation may be completed.

Narrowing the list down. Of course, not all colleges can be listed in a single display. Some principle is necessary for keeping the list within bounds. The list can be reduced considerably by confining it to those institutions that the student is most likely to go to. Probably for the community college population, these are nearby colleges in the following order: (1) State colleges, (2) State university campuses, (3) local private colleges, and (4) colleges in neighboring states. Of course, no college is named on the list just because it is convenient. The main consideration is that it offer the necessary preparation.

For some exotic occupations it may be necessary to violate the nearby college principle. For example, there are not many graduate schools of oceanography, and very few institutions offer a major in technical writing. For other occupations where the only requirement is a bachelor's degree, a liberal arts major, or a common science major, all colleges would qualify. In that case, the display can simply make that statement without attempting to list the colleges.

Preparing the displays. Once the content of the display has been determined, check to see whether or not some previously prepared display will serve. If so, enter its number on the occupation card. If the occupation is multiple entry, make sure the Colleges number is associated with the correct Program number.

If no satisfactory display already exists, one must be made. The content of the display varies so much that it is difficult to suggest a model. The display shown in figure 6 shows one way of coping with the problem of listing both undergraduate and graduate institutions in a limited space. The display must end with the words, "For a copy press PRINT," and it should contain a warning that the list is incomplete. Perhaps the best way to construct the display is to think of it as the message advising the student what to do when he gets out of junior college.

Formatting the displays. The format is the usual 79-character by 23-line space with a 1,000-character limitation. It should include the warning message and it must contain the PRINT command.

Numbering the displays. The displays are numbered in the usual fashion. That is, there must be a first display numbered 1, and the remaining displays follow consecutively with no gaps in the sequence and no duplication of numbers. There is no upper limit to the number of displays. Do not make up a display, however, just to be filling space.

Enter the number of the display on the occupation card. If the occupation is multiple entry, make sure that each Colleges number is associated with the program and the option that it goes with.

Constructing the Special Displays

When the programs of study are being selected, some occupations will be discovered for which no curriculum designed especially for the occupation exists at the local college, but does exist elsewhere. Examples are beautician if the college does not offer Cosmetology, wastewater treatment operator if the college has no program in Wastewater Treatment, hotel/motel manager if the college lacks a Hotel/Motel Management program.

Construct a Special display for such occupations, telling the student where to go for the training.

Content of the Special display. The content of the display depends on the message. Figure 8 may be used as a model, but each case is different. If the student can go to an out-of-county junior college without paying additional tuition, this information is worth including.

Formatting the display. The format is the usual 79-character by 23-line space with a 1,000-character limitation. The last line must say, "For a copy press PRINT."

Numbering the displays. Special display #1 was prepared by SIGI. It is reserved for new occupations that have been incorporated into SIGI for which local colleges have not yet had time to prepare regular Planning system displays. Therefore the Special displays prepared by the local college begin with #2 and are entered consecutively without gaps or duplicates. Enter the number of the display on the occupation card.

Other displays associated with the Special display. The Special display is shown in place of the Prerequisites, since local prerequisites cannot apply. Usually the Special display contains all the information the student will need to make a decision about the occupation, and in that case he would not see a Program or Colleges display. However, the Program-of-Study and Follow-on Colleges slots are available and can be used for information that would help a student make a decision. In that case, prepare a program showing the student the courses he might expect to take at the place he would go to. Also, prepare a Follow-on Colleges display if that would help the student. The Program of Study and Follow-on Colleges displays should be numbered in the usual fashion. The fact that they are associated with a Special display makes no difference in the way they are numbered.

WICH Occupations

Occupations classified WICH must be treated as if they were two distinct occupations, one terminal and the other transfer. The reason is that for these occupations two different paths to entry exist, and they are mutually exclusive. For example, if a person embarks on a two-year registered nursing program, he or she may not transfer to a four-year program without starting over. The reverse is true if the student starts in a four-year program and then wants to switch to a two-year one. Note that in Appendix A each of the WICH occupations has two pages, one for the two-year version, the other for the four-year.

General Studies Displays

In the Planning system, the student is given the option of seeing the General Studies program, even though it is not associated with any occupation.

The sequence of displays in the General Studies subroutine is shown in figures 13-16. For the purposes of the Planning system, General Studies is defined as the program for students who do not have a particular occupation or major field in mind. It is NOT a remedial program.

The Program of Study display. The Program of Study display for General Studies is exactly like any other Program display, except that no occupation is involved. Therefore Appendix A cannot be used; all the information for the display depends on the resources of the local college. Formatting the display may be difficult because there is so much information to get across. The display shown in figure 16 may or may not serve as a model.

This is a SIGI display

General Studies is a program for persons who have not yet decided on a major or occupation. Some colleges let you take General Studies for only one year; others don't care. You can switch from General Studies to another program at the end of any term. Taking General Studies will help you do these things:

1. Explore different subjects in order to discover an area of study you like. You can sample courses in several areas, looking for one that you enjoy.

2. Take courses (called prerequisites) that you need in order to enroll in more advanced courses.

3. Take subjects that are required for graduation no matter what program of study you are in. Colleges usually require English, social sciences, math, science, and physical education.

At the end of any semester, or after completing General Studies, you may wish to transfer to another program. Most of the courses you have taken in General Studies will also count in the program that you finally select.

NOTE: General Studies is NOT a "remedial" program. If you have problems in math, English, or reading, your college counselor or adviser will help you to find the special courses you need.

Press NEXT.

FIGURE 13

First display in the General Studies sequence. The program of study display for General Studies, which is prepared by the local college, must fit in harmoniously with the other displays in the sequence.

This is a SIGI display

You can use the Prediction system to help you make a judgment about General Studies.

When we show you the program for General Studies, we will tell you how to use the Prediction system.

Press NEXT.

FIGURE 14

Second display in the General Studies sequence. The sequence conforms to the Planning system algorithm of inviting the student to get a prediction of his chances of getting a satisfactory grade in a "key course" for General Studies. If the local college does not have a Prediction system, this display is replaced with another that advises the student to see a counselor for help in estimating his chances of success in the program.

This is a SIGI display

```
     Do you need to find an area of study that interests you?

     Do you need to take introductory courses that will permit you
to enroll in more advanced courses?

     Do you want to get some of your graduation requirements out
of the way?

     If the answer to any of these questions is yes, think seriously
about enrolling in General Studies.


     Now, do you want to plan on General Studies?

          (1)  Yes, plan on General Studies.

          (2)  No, switch to something else.
```

FIGURE 15

Third display in the General Studies sequence. If the student chooses option number 1, the resulting interaction is exactly like that for an occupation: the student sees an occupational overview, a list of prerequisites, and a program of study.

Entire display prepared by local college.

```
In GENERAL STUDIES you explore your interests.  Make a program from the courses   79
below.  Take ANY other course for which you are qualified.  You can stay in Gen.  80
Studies ONE year.  Then you have to change to a major to get a degree.            70
                                                                                   1
AD 111 Basic drawing         FR 107 Practical French                              52
BA 101 Business Organiz.     LB 101 Technical Service                             53
          & Management       MA 109 Technical Math I                              52
BA 103 Bus. Math & Machines  ME 101 Machine Shop I                                50
BY 210 Man & His Environmt.  MK 101 Marketing Principles                          56
CM 101 Communications Media  MU 103 Music (Intro)                                 49
DA 101 Dental Assisting      RS 101 Advanced Reading                              52
DP 101 Data Processing       RR 101 Coll. Read. Improvemt.                        58
DP 103 Data Proc. Survey     SC 106 Biology Concepts                              52
EE 113 Electrical Circuits   SP 107 Practical Spanish I                           55
EE 501 Electric Orientation  SS 101 Contemporary Society                          56
EN 101 Drafting & Graphics   SY 101 Typing I                                      44
EN 121 Architect. Drawing    SY 105 Office Skills                                 49
EN 501 Engineer. Orient.                                                          24
                                                                                   1
For a copy press PRINT; otherwise press NEXT.                                     45
                                                                                 ---
                                                                                 978
```

FIGURE 16

The Program of Study display for General Studies. Like any other Program display, it is prepared by the local college and must conform to the 79-character by 23-line format with the usual 1,000-character limitation. The Program of Study is preceded by a Prerequisites display like that shown in Figure 3, Chapter I.

Numbering the Program for General Studies. The Program of Study for General Studies is numbered in the same way as any other program. It does not have to be assigned a unique number simply because it is associated with General Studies rather than an occupation. Enter the number on the occupation card for General Studies (occupation number 345).

Prerequisites for General Studies. The Program of Study for General Studies will require a Prerequisite display. It is prepared and numbered in the same way as any other Prerequisites display. Enter the Prerequisites number on the General Studies card.

Preparing the Index Table

Arrange the Program of Study, Prerequisites, Follow-on Colleges, and Special displays in consecutive order in separate groups. Arrange the occupation cards in consecutive order by number.

Check each group to make sure that there are no gaps in the numbering sequence and no duplication of number within a group. If any corrections are made at this point, make sure that the corrections are entered on the occupation cards.

Now assemble a team of experienced counselors or advisers. Let one read from the occupation card the name of the occupation and the number(s) of the program(s) associated with it. If the card shows that a Special display was constructed, read its number before reading the program number, if any. Another member of the team will locate the specified program or Special and check it for sense. It is easy to spot gross errors this way, such as inadvertantly numbering a chemistry program so that it goes with the insurance salesman occupation. If the program seems appropriate, read the Prerequisites number for that program and again check to see whether it is reasonable. The same procedure can be used for Follow-on Colleges. With respect to multiple-entry occupations, make sure that each option goes with the correct sequence of Prerequisites/Program/Follow-on Colleges. That is, if option 1 is physics and option 2 is engineering, make sure that the physics sequence, not the engineering sequence, is associated with option 1.

When all errors have been corrected, prepare the Index Table from the occupation cards. Follow the format shown in figure 11. The Index Table should be checked against the cards to discover transcribing errors. Any errors in numbering can be fatal, and a person not familiar with the local college can seldom catch them.

Financial Aid Displays

The financial aid officer must prepare a set of five displays explaining briefly the sources of Federal, State, and local financial aid. The content can be spread over the five displays in any manner that is convenient, as long as the following conditions are met:

First display. The display may not exceed 24 lines, and no line may contain more than 79 characters. There is no limit on the total number of characters in the display. The next to last line of text should say, "Continued in next display," and the last line MUST say, "For a copy press PRINT;

otherwise press NEXT." Mark the display with identification symbol "CU-12A."

Second display. Same restrictions as the first. Mark it "CU-12B."

Third display. This display is limited to 1,000 characters. Otherwise, the restrictions are the same as for the first display. Mark it "CU-12C."

Fourth display. Same restrictions as the first. Mark it "CU-12D."

Fifth display. This display is limited to 1,000 characters. The words "Continued in the next display" will not appear, as this is the last in the sequence. The display must contain the name or title of the officer handling financial aid applications and information and the location of that person's office. The usual 24-line by 79-character format must be observed. The display should be marked "CU-12E." An example of the fifth display at one college is in figure 9.

Suggestions. There is usually a lot of information to get across in this sequence. Whoever writes the displays will find the space very limited. The following suggestions may be helpful.

1. Do not copy from the college catalog. A display consisting of solid text turns students off.

2. Accept the fact that space is limited. Give "headline" information, and refer students to other sources (the college catalog, counselor, or financial aid officer) for full details. The purpose of the displays is to say, "Don't despair. Aid is available, and you have a good chance of getting it."

3. Organize the information by categories so that, for example, information about loans is clearly separated from information about outright grants, scholarships, work-study programs, and so on.

4. Attempt to find a pleasing format. Use tables, headings, and subheadings to help convey the message.

Display Containing Instructions for Enrolling

A display must be constructed similar to the one illustrated in figure 10. Its purpose is to tell the student whom to see in order to enroll in a program at his local college. It must contain the following information:

1. The name or title of the person or office handling registration and program changes.

2. The words "Press NEXT" as the last line of text.

The display may contain other advice as long as it does not exceed the

1,000-character limitation. Lines must not contain more than 79 characters, and the limit on lines is 24.

(Keep it brief.)

Mark the display "CU-13" for identification.

DISPLAYS THAT MAY BE EDITED

It is physically possible to edit the text of some of the displays illustrated in the figures and labeled as prepared by SIGI. These are the master frame in which the list of high school prerequisites is inserted (figure 3), the information about requirements for the Associate degree and for transfer (figure 5), and the instructions for reconciling old and new programs (figure 7). We use the expression "physically possible" in order to discourage local colleges from asking for unique displays, except where essential. Unique displays may be overlooked when a computer disk for a college is revised and sent out. The displays that the college constructs apparently provide enough scope for colleges to express their individuality.

Nevertheless, there may be occasions when a college feels it MUST change the wording of a display. Please discuss these situations with ETS. The chart below will give you an idea of what can and cannot be done.

LIMITATIONS ON EDITING

Possible	Impossible
1. Change the text of a display.	1. Make an insert (e.g., the list of prerequisites in figure 3) appear in a different place on the screen.
2. Reduce a display (such as the 1st, 2nd, or 4th in the financial aid sequence) from more than 1,000 characters to fewer than 1,000.	2. Use more than one display in a place programmed for only one. (E.g., if a program of study display is too long, you cannot spread it over two displays.)
	3. Make up a new display to be inserted in the program.
	4. Exceed the 79-character limitation.
	5. Exceed the 1,000-character restriction on displays where that limit is specified.
	6. Exceed the 23- or 24-line limitation.
	7. Change the "NEXT," "PRINT or NEXT," or "PRINT" commands to something else.

NOTE: Some persons have wondered why there is a 1,000-character limitation on so many displays when the terminal is capable of showing 1,920 (24X80). The reason is that the SIGI displays are stored in "frames," each of which can hold up to 1,024 characters. As long as a display consists of fewer characters than that, the computer can simply retrieve a frame and put it on the screen. When an unusually long message is required, the computer is programmed to display two frames simultaneously, one below the other. The computer has already been programmed to display a single frame in all those instances where we say a 1,000-character limitation exists, and the program cannot be changed. In those instances where we say there is no limit on characters (e.g., the first display in the financial aid sequence), the computer has already been programmed to display two frames.

Although one frame can contain 1,024 characters, some of the characters must be reserved for formatting. Hence we say the limit is 1,000 characters rather than 1,024.

NOTE ON THE 79-CHARACTER LINE: If the terminal can hold 80 characters per line, why are the displays restricted to 79? The answer is that the displays are stored in memory as one continuous string of characters rather than as a formatted page. When the displays are put into the system, the typist at the keyboard inserts a special invisible end-of-line character following the last visible character in each line of text. The computer starts a new line on the screen whenever it encounters this character. If a line of text happened to consist of exactly 80 characters, there would be no room for the end-of-line signal. Hence the text of any line may not contain more than 79 characters.

When you count the total number of characters in a display, you must include the end-of-line signals. For example, the fourth line of text in figure 8 counts to 80 characters--79 for text and 1 for end-of-line signal.

SUGGESTIONS FOR FOUR-YEAR COLLEGES

This manual was originally written for community colleges. However, all the occupational descriptions (Appendix A) and all the information about formatting and indexing displays apply equally well to four-year colleges. We suggest that four-year colleges adopt the following strategy:

1. If an occupation is classified TERM or is the two-year version of the WICH classification, prepare a SPECIAL display listing appropriate community colleges, voc.-tech. schools, or accredited proprietary schools where the student can get training for the occupation. SPECIAL displays and their function are described on pages 24-25.

2. If an occupation is classified as SHUD, treat it as multiple entry. (See page 18, item 4 through page 19, item 5.) One option will be the two-year path to entry and will lead to a SPECIAL display exactly like the displays described in the previous paragraph. The other option(s) will be four-year paths to entry which will lead to PROGRAM-OF-STUDY displays for your college, assuming that the student can get preparation there.

3. You probably will not need a FOLLOW-ON COLLEGES display unless an occupation is classified GRAD or PROF. Preparation for many occupations will have been completed with the bachelor's degree awarded by your college, and there will be no follow-on institution that the student has to transfer to.

4. Since your program displays must cover eight semesters of courses instead of only half that number for a community college, you may find the necessary information difficult to compress into 1000 characters. If you have information as to distribution requirements or graduation requirements that would appear on every (no exceptions) PROGRAM-OF-STUDY display, you can place that information in the display (SIGI #CU-5) reproduced as figure 5 and discussed on page 30 and page C-4 of appendix C. This practice will liberate some space for your program display. CU-5 appears every time a PROGRAM-OF-STUDY display appears; but since the former is unique, its message must be true for all programs.

Even so, you may find that your PROGRAM-OF-STUDY displays are hard to construct. Pages 33 and 34 reproduce two PROGRAM-OF-STUDY displays and the CU-5 that were done by Illinois State University for their SIGI. They may (or may not) be useful models for your own college or university.

APPENDIX A[*]

INFORMATION FOR PLANNING DISPLAYS

The occupations are arranged consecutively by number.

See the text, pages 16 and 17, for an explanation of how the appendix is to be used.

Note particularly that the names listed under POSSIBLE CURRICULA are only suggestions. These are the names used by various colleges to designate a major field. The curricula may not all be equivalent, nor does the fact that a curriculum is listed mean that it is necessarily appropriate for the occupation. Always refer to college catalogs and examine the courses included in a curriculum before recommending that curriculum.

Note also that courses listed under SUGGESTED ELECTIVES are only suggestions.

---

[*] For purposes of this report, we have limited Appendix A to examples of information on six representative occupations. The complete Appendix A is available upon request.

NAME AND NUMBER OF OCCUPATION: Architect 107

CLASSIFICATION: PROF

OVERVIEW:

ARCHITECT

```
1. Enroll in architecture in college.

2. If you start in a community college, select a 4-year college that offers a
   bachelor's degree in architecture. Take courses required for transfer. If
   the college requires the Architectural School Aptitude Test, take it late in
   your first year of college. Transfer.

3. Try to get a summer job drafting in an architecture firm or working in the
   construction trades.

4. Get bachelor's or higher degree in architecture. Colleges differ in their
   programs and degrees. You will have to spend at least 4 years in college
   for a bachelor's degree; more likely it will be 7 or 8 years, leading to
   both a bachelor's and a master's. Some colleges grant a Ph.D. degree.

5. After college, get license by completing 3 years of internship (at full pay)
   under a licensed architect and passing the license exam in the state where
   you will work.

For a copy press PRINT; otherwise press NEXT.
```

POSSIBLE CURRICULA: Architecture, Architectural Design

SUGGESTED ELECTIVES: Landscaping & Planning, Basic Drawing

SPECIAL NOTES: None

NAME AND NUMBER OF OCCUPATION: Economist 135

CLASSIFICATION: GRAD

OVERVIEW:

```
*****************************************************************************
*                              Economist                                    *
*                                                                           *
*                                                                           *
* 1. Take economics in college.                                             *
*                                                                           *
* 2. If you start at a community college, take economics or business administra- *
*    tion.  Include courses in math (calculus, if possible), economics, account- *
*    ing, social sciences.                                                  *
*                                                                           *
*    Select a 4-year college with a program in economics and include in your pro- *
*    gram courses required for transfer.  If your community college offers few *
*    economics courses, plan to transfer after 1 year of community college. *
*                                                                           *
* 3. Get bachelor's degree.                                                 *
*                                                                           *
* 4. Graduate training highly desirable, with concentration in 3 or 4 specialized *
*    areas, such as international economics, economics theory and history, money *
*    and banking, public finance, economic development, labor relations, indus- *
*    trial organization.                                                    *
*                                                                           *
* 5. For a position in industry, related experience is very desirable.      *
*                                                                           *
* For a copy press PRINT; otherwise press NEXT.                             *
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*****************************************************************************
```

POSSIBLE CURRICULA: Business Administration, Business Economics, Commerce, Finance, Economics

SUGGESTED ELECTIVES: College Math

SPECIAL NOTES: None

NAME AND NUMBER OF OCCUPATION: Actuary 112

CLASSIFICATION: BACH

OVERVIEW:

ACTUARY

```
1. Enroll in statistics or actuarial science in college.  Also take courses in
   accounting, insurance, economics, and business.

2. If you start in a community college, select a 4-year college with a bache-
   lor's program in statistics or actuarial science.  Take courses required
   for transfer.

3. While in college, try for summer jobs with an insurance company.  Some have
   summer training programs for actuaries.

4. In senior year take preliminary actuary exams of the Society of Actuaries
   or the Casualty Actuarial Society.  They will help in getting a job.

5. Get bachelor's degree.

6. To get full professional status in The Casualty Actuarial Society (casualty
   insurance) or The Society of Actuaries (life insurance), take a series of 9
   cr 10 exams after getting hired.  They will take 5 to 10 years to complete.

For a copy press PRINT; otherwise press NEXT.
```

POSSIBLE CURRICULA: Mathematics, Actuarial Science

SUGGESTED ELECTIVES: Economics, Speech, U. S. History, Accounting, Statistics

SPECIAL NOTES: None

NAME AND NUMBER OF OCCUPATION: Advertising Copywriter 102

CLASSIFICATION: SHUD

OVERVIEW:

```
***************************************************************************
*                       ADVERTISING COPYWRITER                            *
*                                                                         *
*                                                                         *
* 1. Writing ability is the most important requirement for success; your training *
*    should aim at sharpening that ability.  In college take courses in English   *
*    composition, advanced composition, and creative writing; or take journalism  *
*    with an "advertising sequence" or "advertising emphasis," if offered.        *
*                                                                         *
* 2. If you start at a community college, take writing and journalism courses.   *
*    If you plan to transfer, select a 4-year college with a writing program or   *
*    journalism with an "advertising sequence," and take courses required for    *
*    transfer.                                                            *
*                                                                         *
* 3. Get a good liberal arts background in college.  A course in the principles  *
*    of advertising will help.                                            *
*                                                                         *
* 4. While in college, do advertising for the school newspaper and get summer    *
*    jobs in advertising firms or the advertising department of a newspaper or   *
*    magazine.                                                            *
*                                                                         *
* 5. Get degree.  A bachelor's may help you get hired, but your best asset is    *
*    writing ability.                                                     *
*                                                                         *
* For a copy press PRINT; otherwise press NEXT.                           *
*                                                                         *
*                                                                         *
*                                                                         *
*                                                                         *
*                                                                         *
***************************************************************************
```

POSSIBLE CURRICULA: Journalism, English, Advertising, Marketing

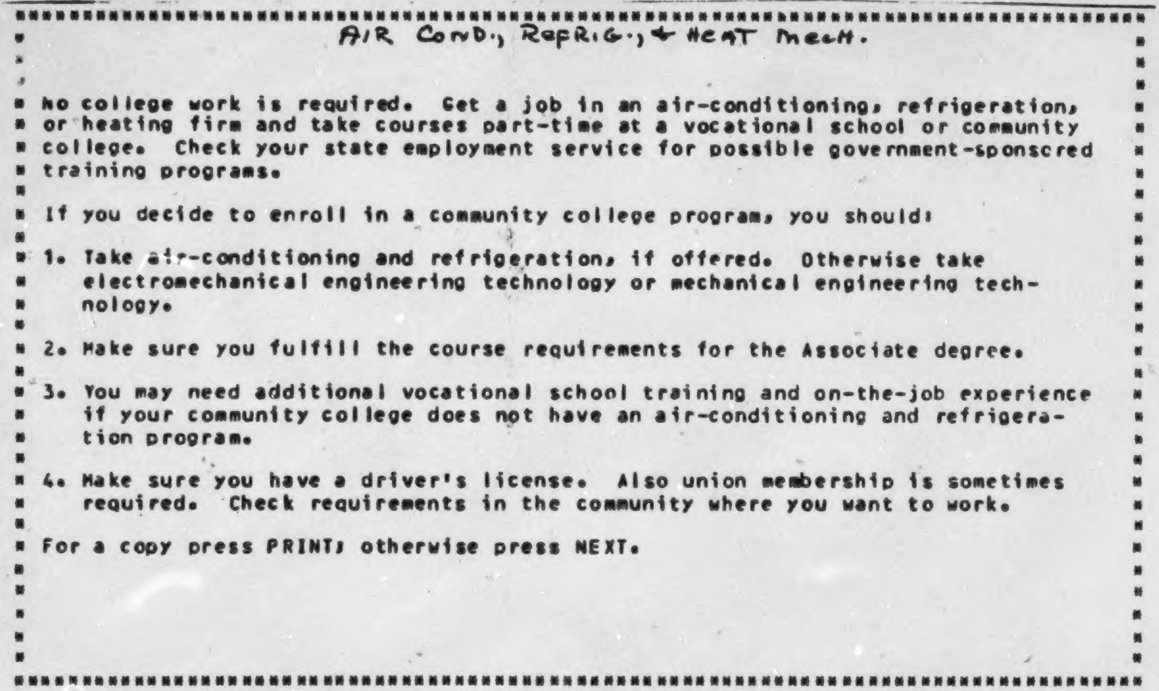
SUGGESTED ELECTIVES: Introductory Psychology, Journalism, Social Psychology

SPECIAL NOTES: College courses in advertising that are one of the options for a Business major are not the best preparation for an advertising copywriter. They deal with the business side of advertising. On the other hand, courses that are one of the options for a Journalism major usually deal with the creative side of advertising and are appropriate for the would-be copywriter. The advertising option for Journalism is sometimes called the "advertising sequence" or "advertising emphasis."

NAME AND NUMBER OF OCCUPATION: Air-conditioning, Refrigeration, and Heating Mechanic 103

CLASSIFICATION: TERM

OVERVIEW:



AIR COND., REFRIG., + HEAT MECH.

```
No college work is required.  Get a job in an air-conditioning, refrigeration,
or heating firm and take courses part-time at a vocational school or community
college.  Check your state employment service for possible government-sponsored
training programs.

If you decide to enroll in a community college program, you should:

1. Take air-conditioning and refrigeration, if offered.  Otherwise take
   electromechanical engineering technology or mechanical engineering tech-
   nology.

2. Make sure you fulfill the course requirements for the Associate degree.

3. You may need additional vocational school training and on-the-job experience
   if your community college does not have an air-conditioning and refrigera-
   tion program.

4. Make sure you have a driver's license.  Also union membership is sometimes
   required.  Check requirements in the community where you want to work.

For a copy press PRINT; otherwise press NEXT.
```

POSSIBLE CURRICULA: Air-Conditioning Engineering Technology, Air-Conditioning and Refrigeration, Electro Mechanical Technology, Refrigeration Technology

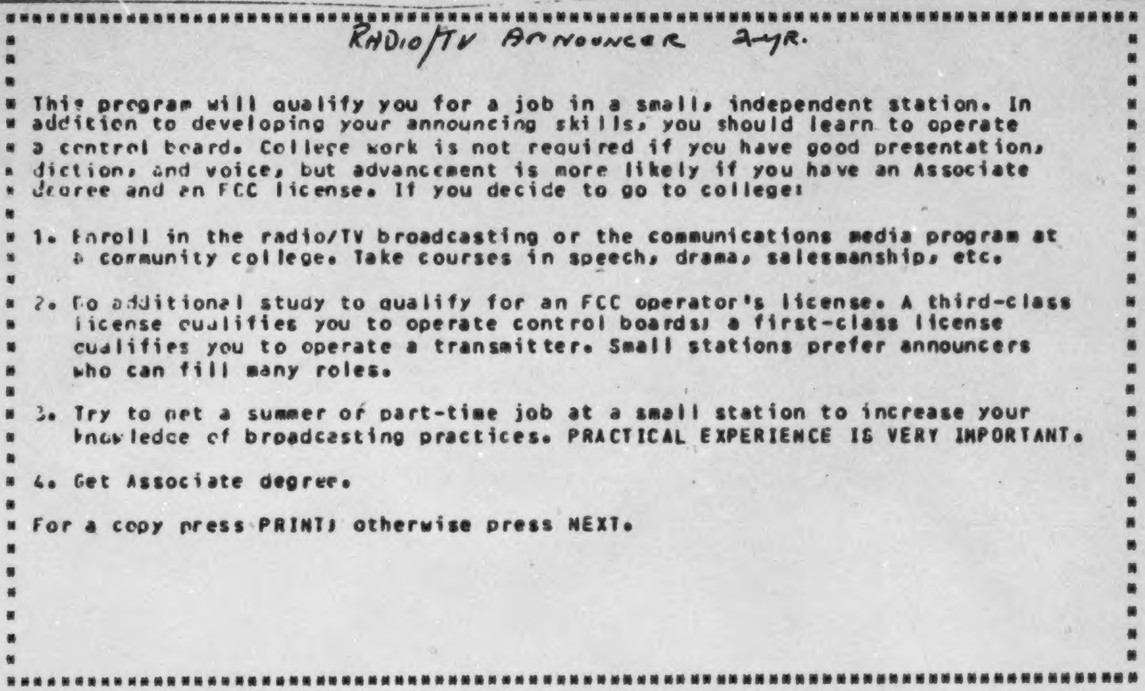
SUGGESTED ELECTIVES: None

SPECIAL NOTES: Apprenticeship programs are offered in some states. If available, such a program can be recommended as an option.

NAME AND NUMBER OF OCCUPATION: Radio/TV Announcer (two-year) 189

CLASSIFICATION: WICH

OVERVIEW:



RADIO/TV ANNOUNCER 2-YR.

This program will qualify you for a job in a small, independent station. In addition to developing your announcing skills, you should learn to operate a control board. College work is not required if you have good presentation, diction, and voice, but advancement is more likely if you have an Associate degree and an FCC license. If you decide to go to college:

1. Enroll in the radio/TV broadcasting or the communications media program at a community college. Take courses in speech, drama, salesmanship, etc.

2. Do additional study to qualify for an FCC operator's license. A third-class license qualifies you to operate control boards; a first-class license qualifies you to operate a transmitter. Small stations prefer announcers who can fill many roles.

3. Try to get a summer or part-time job at a small station to increase your knowledge of broadcasting practices. PRACTICAL EXPERIENCE IS VERY IMPORTANT.

4. Get Associate degree.

For a copy press PRINT; otherwise press NEXT.

POSSIBLE CURRICULA: Electrical & Electronics Technology, Radio/TV Technology

SUGGESTED ELECTIVES: None

SPECIAL NOTES: A student choosing the two-year route to this occupation should expect to work in a small radio station, where the production and engineering functions are often performed by the same person. Therefore, should know all aspects of the field, including the technological. Securing a First-Class Radiotelephone Operator's license from the FCC is highly recommended.

NAME AND NUMBER OF OCCUPATION: Radio/TV Announcer (four-year) 189

CLASSIFICATION: WICH

OVERVIEW:

```
                     RADIO/TV ANNOUNCER 4-YR.

This program will qualify you for a job in a large network station. To prepare:

1. Enroll in radio/TV broadcasting or journalism in college. Take courses in
   speech and diction. A liberal arts background is desirable in addition to
   technical training.

2. If you start at a community college, select a 4-year college with a bache-
   lor's program in radio/TV broadcasting or journalism. Take courses required
   for transfer.

3. Join the college radio station and get summer jobs at a radio or TV station.
   PRACTICAL EXPERIENCE IS VERY IMPORTANT. In many cases you will be required
   to have an FCC operator's license. Study FCC regulations. If possible, check
   requirements of the station where you want to work.

4. Get bachelor's degree.

5. Make tapes of your voice and reading ability to present to employers and
   agents.

For a copy press PRINT; otherwise press NEXT.
```

POSSIBLE CURRICULA: Broadcasting, Drama, Dramatic Arts, Radio & TV, Radio & TV Broadcasting, Speech, Speech & Drama, Speech & Theatre, Theatre Arts

SUGGESTED ELECTIVES: Government, Journalism, Economics, Urban Sociology

SPECIAL NOTES: The four-year route aims at preparing the student for announcing in a large station where the production and engineering functions are performed by different personnel. The four-year program should include some voice training, journalism (for the news), and speech.

APPENDIX D

SIGI EVALUATION INSTRUMENTS

EDUCATIONAL TESTING SERVICE PRINCETON, N.J. 08540

Area Code 609
921-9000
CABLE-EDUCTESTSVC

Developmental Research Division

July 20, 1976

Mr. Joseph Tinnin
Eastfield College
3737 Motley Drive
Mesquite, TX 75150

A letter similar in content to this one was sent to each of the field-test colleges.

Dear Joe:

Thank you for helping me get started on our evaluation of SIGI at Eastfield. Let me know when Joel returns so that I can fill him in on whatever progress we've made by that time.

As I mentioned in our telephone conversation, our evaluation efforts are branched in four major directions. The attached sketch gives an overview of these directions and the kinds of data we expect to collect.

The most immediate concern is our evaluation of the impact of SIGI on students. For this part of our study, we need your help in distributing two different questionnaires to two independent groups of students:

- SIGI Evaluation Questionnaire - C (yellow). To be distributed to students who express an interest in using SIGI but who have not yet done so. Students who complete this questionnaire will form our control group.
- SIGI Evaluation Questionnaire - E (green). To be distributed to students who have been all the way through SIGI at least once. These students will make up our experimental group.

How you handle distribution of the questionnaires will depend upon scheduling procedures, staffing, etc., at Eastfield. However, I would like to caution you on two points: (1) In administering the questionnaires, make sure you do not catch the same student twice, i.e., before using SIGI (as a control) and after completing SIGI (as an experimental). Our experimental and control groups are to be independent samples. (2) Care must be taken to include in the control group only those students who are interested in using SIGI. This precaution is necessary if we are to assume that the control and experimental groups come from the same general population, namely, students who want help with career decision-making.

I've mailed you 150 control questionnaires (yellow) and 150 experimental questionnaires (green). We need approximately 100 of each for our evaluation.

If all goes well, we should have all the questionnaires completed by the end of November. This barely gives us time to analyze the data for our final report to the National Science Foundation. The report is due by January 1, 1977.

I'll be getting back to you later to make arrangements for our visit in late October or early November to interview students at Eastfield. Call if you have any problems with the questionnaires.

Sincerely,

Lila

Lila Norris
Associate Research Psychologist

LN:mb
Encl.

SIGI
SYSTEM OF
INTERACTIVE
GUIDANCE
AND INFORMATION

EDUCATIONAL TESTING SERVICE
PRINCETON, N.J. 08540
609-921-9000

Memorandum for:

Subject: Log of SIGI-Related Problems

Date:

From: Lila Norris

During September, October, and November, we will be collecting information about SIGI-related problems at each of our field-trial colleges. This information is to be included in our final report to the National Science Foundation.

To get the necessary data for this part of our evaluation of SIGI, we have designed the enclosed log. All problems that interfere with the smooth running of SIGI during September, October, and November are to be recorded in the log. A new page should be filled out each time a problem occurs.

Needless to say, completeness and accuracy are very important to us. Therefore, the log should be kept by the person at your college who is closest to the daily operation of SIGI. That person may be you, or it may be someone else (SIGI monitor, scheduling secretary, student assistant, etc.). If more than one person is assigned responsibility for the log, please make sure that each knows where the log is kept and what the entries are to look like. A completed sample page is supplied with the log.

As you will see, the questions included in the log are very broad, mainly because we're not sure what kinds of problems to expect. (We have asked the person in charge of SIGI hardware at your college to fill out a more detailed report on hardware failures.) For the log, we would like you to supply whatever information you can that will help us determine the kinds of difficulties that occur in the field and the measures required to correct them.

We hope that few problems will arise during this three-month period and that the log you return to us will be slim! I've enclosed a postage-paid envelope for you to use for mailing your completed log to us at the end of November.

Thank you for your help. If you have any questions about this part of our evaluation of SIGI, don't hesitate to call (609-921-9000, ext. 2316).

LOG ENTRY

Date:

Who reported the problem?

What was the nature of the problem? Describe briefly. (If possible, give subsystem and frame where problem occurred.)

How long was the system down?

Did students miss their sessions on SIGI as a result of this problem? If so, how many students?

What steps were taken to correct the problem?

Was the cause of the problem ever determined? If so, what was it?

Additional comments:

Person completing this entry: ______________________________
Name

____
(Position or Title)

LOG ENTRY

COMPLETED SAMPLE

SIGI

Date: September 1, 1976

Who reported the problem?

Student using SIGI

What was the nature of the problem? Describe briefly. (If possible, give subsystem and frame where problem occurred.)

Student was in Values system. She had just finished summing value weights to 40. Asked for a printout, then pressed NEXT. Nothing happened. Pressed NEXT repeatedly, but next frame would not appear.

How long was the system down?

20 minutes

Did students miss their sessions on SIGI as a result of this problem? If so, how many students?

No

What steps were taken to correct the problem?

I pressed the number "1" (a possible response to the frame which should have been on the screen) and got the appropriate response for that frame. At this point, everything seemed O.K., but I asked the student not to ask for any more printouts during the remainder of her time at the terminal.

Was the cause of the problem ever determined? If so, what was it?

I think the problem may have something to do with the printer. Will contact the Computer Center and have them look into it.

Additional comments:

9/3/76 Bob Jones from the Computer Center called to say that the cause of the problem has been identified. It was the printer. Repairs were made 9/2/76, and Bob mailed a completed "SIGI Hardware Report" to ETS.

Person completing this entry: Mark Halleday
Name

SIGI Student Monitor
(Position or Title)

SIGI
SYSTEM OF
INTERACTIVE
GUIDANCE
AND INFORMATION

EDUCATIONAL TESTING SERVICE
PRINCETON, N.J. 08540
609-921-9000

Memorandum to:

Subject: SIGI Hardware Evaluation
at All Field Trial Colleges

Date:

From: Lila Norris

Starting September 1, 1976, and continuing through December 1, 1976, we will be conducting a formal evaluation of the SIGI hardware at each of our field trial colleges. Information collected during this time will be included in our final report to the National Science Foundation.

We need your help with this part of our evaluation of SIGI. During September, October, and November we would like you to keep a complete record of all problems which occur with the SIGI hardware at your college. Included with this letter is a supply of forms to be filled out and returned to ETS each time you have a hardware problem. The forms are similar to the ones you have been filling out for Bill Godwin. However, for our final report we are interested in finding out about problems which you remedy yourselves as well as those which require a visit from outside repairmen. Therefore, beginning in September, we want you to discontinue use of Bill's forms and report all hardware problems on the ones enclosed.

I realize that keeping such records can be a real nuisance, but please bear with us for this three-month period. After December 1 our data collection will be completed and no further reporting of hardware failures will be necessary.

Thank you for your cooperation.

mb
Encl.

SIGI HARDWARE REPORT

SIGI

Please fill out both sides and return to ETS every time you have a hardware problem. If several devices are involved (for example, several terminals), please use a separate sheet for each device.

1. School Name ______________________________

2. Problem with (check only one):

    ☐ Computer
    ☐ Terminal, Make ______________, Serial No. ________
    ☐ Printer, Make ______________, Serial No. ________
    ☐ Dataphone or line, Telephone No. ______________
    ☐ Other: ______________________________

3. Were outside repairmen called in to help remedy the problem?

    Yes _______ No _______

4. If so, give names of repairmen on this call:

    ____
    ____
    ____

5. Serial number of service report filled out by repairmen at end of call: (If no report was written up, write "none.")

    ____

6. Date and time problem was first reported to repair center (or on-campus repairmen):

    ______________ (Date) ______________ (Time)

7. Date and time repairmen first arrived to begin repairs:

    ______________ (Date) ______________ (Time) (AM/PM)

8. Date and time repairs were completed and unit again worked:

    ______________ (Date) ______________ (Time) (AM/PM)

9. Was this a repeat call for a recurrence of the same problem on the same device?

____

10. If there appeared to be any excessive delay in repairs, or if repairs required more than one visit from repairmen, were you given any explanation for the delay?

____

____

____

____

11. If this was an operation problem, was it due to inadequate documentation on our part? If so, where?

____

____

____

____

12. If this was not an operation problem, what was it? Describe briefly.

____

____

____

____

13. Other comments?

____

____

____

____

Please return to:

Lila Norris
Associate Research Psychologist
Educational Testing Service
Princeton, NJ 08540

SIGI EVALUATION--COLLEGE QUESTIONNAIRE

College:______________________________ Contact Person:____________________

Background Information

1. What is the total enrollment at your college?

__________Day ___________Evening

2. How large is the counseling staff?

______Full-time counselors

______Part-time counselors

______Other counseling staff members (list positions and indicate whether they are full- or part-time):____________________

____

____

3. What services are provided by the counseling staff? (Attach brochure if one is available; otherwise, list services.)

4. Are there other members of the college community (besides counselors) who are involved in career development services?

______Yes ______No

If so, explain:

5. Does your college have a testing program? ______Yes ______No

Describe:

SIGI: Students and Scheduling

6. How many SIGI terminals are currently in use at your college? ________

7. How many students are using SIGI each week? __________________

8. During what hours are SIGI terminals available?

Monday ________ to ________ ______Hours
Tuesday ________ to ________ ______Hours
Wednesday ________ to ________ ______Hours
Thursday ________ to ________ ______Hours
Friday ________ to ________ ______Hours
Saturday ________ to ________ ______Hours
Sunday ________ to ________ ______Hours

Total Hours
Per Week ______Hours

9. How are students getting access to SIGI?

______ Students use SIGI as part of a career guidance course.

______ Students are referred to SIGI by counselors.

______ Students sign up for use of terminals on a first-come, first-served basis.

______ Other: ____

____

10. Who handles scheduling of students on SIGI?

What are the SIGI-related duties of this person?

11. Have you had any difficulties with your scheduling procedure? ____Yes ____No

If so, explain:

12. Are students who get on SIGI given special tests? ________Yes ________No

If so, which ones?

13. Do you have a follow-up session with students after they have been on SIGI?

________Yes ________No

Explain:

SIGI: Prediction and Planning Systems

14. Who worked on your Prediction and Planning Systems? (List names and positions.)

15. Approximately how much time was spent on each of these systems?

16. Did you have any problems preparing the Prediction or Planning Systems?

______Yes ______No

Explain:

17. Do you have any recommendations for changes in the procedures we've established for preparing the Prediction or Planning Systems?

______Yes ______No

Explain:

18. Have other field trial colleges consulted with you about the preparation of their Prediction and Planning Systems?

______Yes ______No

SIGI Evaluation Plans

19. What are your plans for evaluating SIGI? Will you send us a write-up? Will you share your findings with us?

Additional Information

20. How have you advertised SIGI at your college?

21. Have high schools contacted you about SIGI? ______Yes ______No

Explain:

22. Has there been a demand for demonstrations of SIGI at your college? ____Yes ______No

If so, by whom?

SIGI
SYSTEM OF
INTERACTIVE
GUIDANCE
AND INFORMATION

EDUCATIONAL TESTING SERVICE
PRINCETON, N.J. 08540
609-921-9000

Dear Student:

The attached questionnaire was designed by Educational Testing Service to evaluate SIGI, the computer-based guidance system on campus. It's being given to a selected sample of students who have used SIGI and to a sample of students who have not used SIGI.

At first glance, the questionnaire looks like a long one. You'll find, however, that since it's mostly multiple-choice and short-answer, filling it out will go quickly. Please complete the questionnaire today and return it to ETS in the envelope we've provided.

By the way, the information collected for this study will be used for research purposes only and will be kept strictly confidential.

Thank you for taking the time to help with our evaluation of SIGI. Your cooperation will enable us to make guidance services at your college even more effective.

Sincerely,

Lila Norris
SIGI Research Group

SIGI EVALUATION QUESTIONNAIRE - E

Name ______________________________ SIGI User # ______________

College ______________________________ Student I.D.# ______________

PERSONAL INFORMATION

1. Age:
   - ___ (1) 15-22
   - ___ (2) 23-30
   - ___ (3) Over 30
   - ___ (4) Rather not say

2. Sex:
   - ___ (1) Male
   - ___ (2) Female

3. Year in college:
   - ___ (1) 1st
   - ___ (2) 2nd
   - ___ (3) 3rd
   - ___ (4) 4th

CAREER DECISION-MAKING

4. How well do you know what rewards and satisfactions you want from an occupation?
   - ___ (1) I know exactly what I want from an occupation.
   - ___ (2) I have a general idea of what I want from an occupation.
   - ___ (3) I'm not sure what I want from an occupation.
   - ___ (4) I have no idea what I want from an occupation.

5. How many occupations have you explored as possibilities for yourself?
   - ___ (1) None
   - ___ (2) 1-2
   - ___ (3) 3-4
   - ___ (4) More than four

6. How many of the occupations that you know about are likely to give you the satisfactions you want?
   - ___ (1) None
   - ___ (2) 1-2
   - ___ (3) 3-4
   - ___ (4) More than 4

7. Which of the statements below best describes how definite your career plans are?
   - ___ (1) I know exactly the occupation I want to enter.
   - ___ (2) I am trying to decide between two different occupations.
   - ___ (3) I am considering three or more different occupations.
   - ___ (4) I do not have any specific occupation in mind at this time.

8. How well do you think you can predict your grades in various programs at your college?
   - ___ (1) I think I could predict my grades accurately in any program of study I might take.
   - ___ (2) I think I could predict my grades accurately in one or two programs, but not in all
   - ___ (3) I have only a general idea of my grades in one or two programs.
   - ___ (4) I can't predict my grades well in any program.

9. Which of the following best describes the present state of your plans?
   - ___ (1) I know which program to enroll in, which courses to take, and most of the other steps necessary to reach my occupational goal.
   - ___ (2) I have a general idea of which program would be best, but I am not sure what other steps are necessary to reach my occupational goal.
   - ___ (3) I don't know which program to take. I need help in planning my education.

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10. Overall, how confident do you feel about your career decision-making skills?

___ (1) Very confident
___ (2) Somewhat confident
___ (3) Not confident

Items 11-18 are activities related to thinking about occupations. Put a check under the heading which shows how much time you have spent on each of the activities.

	Never	Rarely	Sometimes	Often
11. Reading about occupations.	___	___	___	___
12. Talking with friends about the kinds of occupations they are considering.	___	___	___	___
13. Talking with people in the field about their occupations.	___	___	___	___
14. Using the college's career reference library.	___	___	___	___
15. Attending career planning workshops.	___	___	___	___
16. Talking to a guidance counselor about careers.	___	___	___	___
17. Using career-related audiovisual materials.	___	___	___	___
18. Using a computer-based guidance system.	___	___	___	___

For statements 19-24, put a check under the heading that best describes how you feel.

	Strongly Disagree	Disagree	Agree	Strongly Agree
19. I would follow the advice of a teacher, counselor, parent, or friend in planning my career.	___	___	___	___
20. Which occupation I enter will be mostly a matter of chance.	___	___	___	___
21. Everyone seems to tell me something different, so I don't know which career to choose.	___	___	___	___
22. I will decide for myself which occupation to choose.	___	___	___	___
23. In order to plan for a career, I would need to know how soon I would be getting married.	___	___	___	___
24. There is plenty of time before I have to start thinking about choosing an occupation.	___	___	___	___

25. Rate yourself on how good a career decision-maker you think you are.

Look at the scale below. Think of a friend your age who, in your opinion, makes good career decisions. Consider that person at the top of the scale (10).

Think of a friend your age who is not a good career decision-maker. Consider that person at the bottom of the scale (0).

Now think about yourself as a career decision-maker. Where do you fit on this scale? Circle the appropriate number on the scale from 0 to 10.

0 1 2 3 4 5 6 7 8 9 10

A poor career decision-maker — A good career decision-maker

For items 26- 29 mark an X on the part of the scale which best shows what is true of you.

26. How much do you know about occupations?

0 1 2 3 4

very little — a great deal

27. How often do you plan ahead?

0 1 2 3 4

rarely — often

28. How do you feel after making an important decision?

0 1 2 3 4

I usually don't think I've done the right thing. — I am sure I did the right thing

29. How clear is your knowledge of goals and values?

0 1 2 3 4

not clear — very clear

OCCUPATIONAL INFORMATION

30. What occupation would you most like to prepare yourself for eventually? Even if you are undecided, pick an occupation that appeals to you.

Name of occupation: ______________________________

Answer questions 31-34 in relation to the occupation named in Item 30.

31. To enter this occupation, how much education beyond high school would you need?

___ (1) None.
___ (2) 2 years.
___ (3) 4 years (bachelor's degree).
___ (4) 5-6 years (master's degree).
___ (5) 7 or more (doctorate or law degree).
___ (6) Other (please explain: ______________________________)
___ (7) I don't know.

32. Check the salary range that indicates the average amount of money per year earned by people in this occupation.

___ (1) $20,000 or more
___ (2) $15,000-$19,999
___ (3) $11,000-$14,999
___ (4) $8,000-$10,999
___ (5) $7,999 or less
___ (6) I don't know.

33. Check the one statement which best describes the amount of supervision usually received by workers in this occupation.

___ (1) Work without supervision; plan own work; seldom evaluated by others.
___ (2) Supervised weekly; follow overall assignments.
___ (3) Supervised daily; work under supervisor who assigns and schedules work; free to decide details of work.
___ (4) Supervised hourly; activities are directly supervised with little opportunity to act on your own.
___ (5) I don't know.

34. Check the one statement which best describes the future employment prospects for workers in this occupation.

___ (1) Excellent: Strong demand for workers; shortage of qualified people.
___ (2) Good: Steady demand for workers.
___ (3) Fair: Demand limited except in certain geographic areas OR demand is decreasing due to automation or economic conditions.
___ (4) Poor: Little demand, if any; the occupation is very overcrowded, and few jobs are available.
___ (5) I don't know.

35. What college program (major) are you presently enrolled in? ____________________

36. What occupation are you preparing for in this program or major? ____________________

CAREER GUIDANCE

37. Have you seen a counselor during the last two months? ___(1) Yes ___(2) No

38. If yes, what thing(s) did you discuss?
___ (1) Your values
___ (2) Occupational choice
___ (3) Occupational information
___ (4) Curriculum choice
___ (5) Course selection
___ (6) Chances for success
___ (7) Program approval
___ (8) Family pressures
___ (9) Financial aid
___(10) Other (please explain: ______________________________)

39. Have you taken or are you presently enrolled in a career guidance course at your college? ____(1) Yes ____(2) No

40. If yes, how would you rate it?
___ (1) Excellent
___ (2) Adequate
___ (3) Poor

41. How do you feel about interacting with a computer for career guidance?
___ (1) Favorable
___ (2) Neutral
___ (3) Unfavorable

EVALUATION OF SIGI

Circle the grade that you would give SIGI on each of the following:

42. How interesting was SIGI to you? A, B, C, D, or F

43. How clear was SIGI in giving information? A, B, C, D, or F

44. Overall, how good is SIGI? A, B, C, D, or F

Circle the grade that shows how useful SIGI was in each of the following:

45. Helping you decide which occupation to prepare for. A, B, C, D, or F

46. Helping you become more aware of your values. A, B, C, D, or F

47. Showing you the relationship between values and career decisions. A, B, C, D, or F

48. Helping you find out which occupations might fit your values. A, B, C, D, or F

49. Helping you get information about occupations. A, B, C, D, or F

50. Helping you understand grade predictions expressed in probabilities. A, B, C, D, or F

51. Helping you estimate probabilities of success in one or more programs. A, B, C, D, or F

52. Giving information about programs of study at your school. A, B, C, D, or F

53. Helping you plan a program appropriate for an occupation you are considering. A, B, C, D, or F

54. Helping you learn how to make career decisions. A, B, C, D, or F

55. What role has SIGI played in your occupational choice?
___ (1) SIGI helped me to choose an occupation.
___ (2) SIGI helped confirm the choice I had already made.
___ (3) SIGI suggested other things which I am considering.
___ (4) SIGI provided little or no help.

To get help with occupational and educational decisions, you can go to SIGI and to a counselor. For each of the following, (56-63), put a check under the heading which, in your opinion, represents the best source of help.

	SIGI Alone	Counselor Alone	SIGI & Counselor
56. Plan program of study	___	___	___
57. Get information about occupations	___	___	___
58. Confirm an occupational choice	___	___	___
59. Find occupations that fit values	___	___	___
60. Find out about financial aid	___	___	___
61. Make values more clear	___	___	___
62. Resolve conflicts about occupational choice	___	___	___
63. Estimate chances of success in a program	___	___	___

64. Have you scheduled or do you plan to schedule an appointment with a counselor as a result of using SIGI? ____(1) Yes ____(2) No

65. If yes, what was or will be the purpose of this visit? Check all the topics you discussed or plan to discuss.
___ (1) Your values
___ (2) Occupational choice
___ (3) Occupational information
___ (4) Curriculum choice
___ (5) Course selection
___ (6) Chances for success
___ (7) Program approval
___ (8) Family pressures
___ (9) Financial aid
___(10) SIGI print-outs
___(11) Other (please explain: ____________________________________)

66. In using SIGI, did the occupations of interest to you show up on the list determined by your values? ____(1) Yes ____(2) No

67. Were there any occupations missing from SIGI that you were interested in? ____(1) Yes ____(2) No

If yes, name them: ____

____

68. Compared to other kinds of occupational information, how would you rate the occupational information presented in SIGI?
___ (1) Better
___ (2) About the same
___ (3) Worse

69. SIGI has 28 questions you can ask about occupations. Are there other questions about occupations that you wish had been in SIGI? ____(1) Yes ____(2) No

If yes, what question(s) would you add to the SIGI list?

____

____

____

70. How would you rate SIGI's writing style and vocabulary?
___ (1) Too difficult
___ (2) Just right
___ (3) Too simple

71. Did you find sexual, racial, or other bias in SIGI? ____(1) Yes ____(2) No

If yes, give examples:

____

____

____

____

72. Below is a list of problems that may have occurred in using SIGI. Check any that you experienced:
___ (1) I did not understand some of the directions.
___ (2) The writing on the screen strained my eyes.
___ (3) I had to wait too long for an appointment to use SIGI.
___ (4) There was too much reading.
___ (5) I felt rushed while using SIGI.
___ (6) The computer broke down while I was using SIGI.
___ (7) The writing on the screen was jumbled.
___ (8) I wanted to sign off SIGI, but couldn't.
___ (9) Other (please explain: ______________________________)

73. How often did you request a print-out on SIGI?
___ (1) Frequently
___ (2) Sometimes
___ (3) Once or twice
___ (4) Never

74. After using the computer, did you do anything to get more information on your own? ____(1) Yes ____(2) No

75. If yes, what did you do?
___ (1) Read
___ (2) Spoke to people in the occupation
___ (3) Used audiovisual material
___ (4) Other (please explain: ______________________________)

76. How much time did you spend on SIGI?
___ (1) 1-2 hours
___ (2) 2-4 hours
___ (3) 4-6 hours or more

77. Did you go all the way through SIGI (including the Strategy section)? ____(1) Yes ___(2) No

78. Over how many sessions did you use SIGI?
___(1) One
___(2) Two
___(3) Three or more

79. Do you think you would profit from further use of SIGI? ___(1) Yes ___(2) No

80. If yes, how many additional sessions would you like?
___(1) One
___(2) Two
___(3) Three or more

81. Which sections would you use most?
___(1) Values
___(2) Locate
___(3) Compare
___(4) Prediction
___(5) Planning
___(6) Strategy

82. Is there anything SIGI didn't cover that you would like it to cover?
___(1) Yes ___(2) No

If yes, please explain:

83. Is there any area you wish SIGI had covered more fully? ___(1) Yes ___(2) No

If yes, please explain:

84. What did you like best about SIGI? (check one only)
___(1) Learning about my values
___(2) Finding occupations that fit my values
___(3) Getting occupational information
___(4) Getting grade predictions
___(5) Learning what courses to take to prepare for an occupation
___(6) Learning a strategy for making decisions
___(7) Learning how values affect decisions
___(8) Other (please explain: ______________________________)

85. What you did on SIGI was completely private. How important is this fact to you?

0 1 2 3 4

privacy made no difference — very important

86. Have you advised friends at your college to use SIGI? ___(1) Yes ___(2) No

87. If yes, how many?
___(1) 1-2
___(2) 3-5
___(3) 6 or more

88. Is there anything else you would like to tell us that would help us improve SIGI?

PLEASE RETURN THIS QUESTIONNAIRE TO ETS IN THE ENVELOPE PROVIDED.
THANK YOU FOR YOUR COOPERATION.

SIGI EVALUATION QUESTIONNAIRE - C

Name ____

College ____________________________ **Student I.D.#** ________________

PERSONAL INFORMATION

1. Age:
___ (1) 15-22
___ (2) 23-30
___ (3) Over 30
___ (4) Rather not say

2. Sex:
___ (1) Male
___ (2) Female

3. Year in college:
___ (1) 1st
___ (2) 2nd
___ (3) 3rd
___ (4) 4th

CAREER DECISION-MAKING

4. How well do you know what rewards and satisfactions you want from an occupation?
___ (1) I know exactly what I want from an occupation.
___ (2) I have a general idea of what I want from an occupation.
___ (3) I'm not sure what I want from an occupation.
___ (4) I have no idea what I want from an occupation.

5. How many occupations have you explored as possibilities for yourself?
___ (1) None
___ (2) 1-2
___ (3) 3-4
___ (4) More than four

6. How many of the occupations that you know about are likely to give you the satisfactions you want?
___ (1) None
___ (2) 1-2
___ (3) 3-4
___ (4) More than 4

7. Which of the statements below best describes how definite your career plans are?
___ (1) I know exactly the occupation I want to enter.
___ (2) I am trying to decide between two different occupations.
___ (3) I am considering three or more different occupations.
___ (4) I do not have any specific occupation in mind at this time.

8. How well do you think you can predict your grades in various programs at your college?
___ (1) I think I could predict my grades accurately in any program of study I might take.
___ (2) I think I could predict my grades accurately in one or two programs, but not in all.
___ (3) I have only a general idea of my grades in one or two programs.
___ (4) I can't predict my grades well in any program.

9. Which of the following best describes the present state of your plans?
___ (1) I know which program to enroll in, which courses to take, and most of the other steps necessary to reach my occupational goal.
___ (2) I have a general idea of which program would be best, but I am not sure what other steps are necessary to reach my occupational goal.
___ (3) I don't know which program to take. I need help in planning my education.

10. Overall, how confident do you feel about your career decision-making skills?
___ (1) Very confident
___ (2) Somewhat confident
___ (3) Not confident

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Items 11-18 are activities related to thinking about occupations. Put a check under the heading which shows how much time you have spent on each of the activities.

		Never	Rarely	Sometimes	Often
11.	Reading about occupations.	___	___	___	___
12.	Talking with friends about the kinds of occupations they are considering.	___	___	___	___
13.	Talking with people in the field about their occupations.	___	___	___	___
14.	Using the college's career reference library.	___	___	___	___
15.	Attending career planning workshops.	___	___	___	___
16.	Talking to a guidance counselor about careers.	___	___	___	___
17.	Using career-related audiovisual materials.	___	___	___	___
18.	Using a computer-based guidance system.	___	___	___	___

For statements 19-24, put a check under the heading that best describes how you feel.

		Strongly Disagree	Disagree	Agree	Strongly Agree
19.	I would follow the advice of a teacher, counselor, parent, or friend in planning my career.	___	___	___	___
20.	Which occupation I enter will be mostly a matter of chance.	___	___	___	___
21.	Everyone seems to tell me something different, so I don't know which career to choose.	___	___	___	___
22.	I will decide for myself which occupation to choose.	___	___	___	___
23.	In order to plan for a career, I would need to know how soon I would be getting married.	___	___	___	___
24.	There is plenty of time before I have to start thinking about choosing an occupation.	___	___	___	___

25. Rate yourself on how good a career decision-maker you think you are.

Look at the scale below. Think of a friend your age who, in your opinion, makes good career decisions. Consider that person at the top of the scale (10).

Think of a friend your age who is not a good career decision-maker. Consider that person at the bottom of the scale (0).

Now think about yourself as a career decision-maker. Where do you fit on this scale? Circle the appropriate number on the scale from 0 to 10.

0 1 2 3 4 5 6 7 8 9 10

A poor career decision-maker — A good career decision-maker

For items 26- 29 mark an X on the part of the scale which best shows what is true of you.

26. How much do you know about occupations?

0 — 1 — 2 — 3 — 4

very little ... a great deal

27. How often do you plan ahead?

0 — 1 — 2 — 3 — 4

rarely ... often

28. How do you feel after making an important decision?

0 — 1 — 2 — 3 — 4

I usually don't think I've done the right thing. ... I am sure I did the right thing.

29. How clear is your knowledge of goals and values?

0 — 1 — 2 — 3 — 4

not clear ... very clear

OCCUPATIONAL INFORMATION

30. What occupation would you most like to prepare yourself for eventually? Even if you are undecided, pick an occupation that appeals to you.

Name of occupation: ______________________________

Answer questions 31-34 in relation to the occupation named above.

31. To enter this occupation, how much education beyond high school would you need?

___ (1) None.
___ (2) 2 years.
___ (3) 4 years (bachelor's degree).
___ (4) 5-6 years (master's degree).
___ (5) 7 or more (doctorate or law degree).
___ (6) Other (please explain: ______________________________)
___ (7) I don't know.

32. Check the salary range that indicates the average amount of money per year earned by people in this occupation.

___ (1) $20,000 or more
___ (2) $15,000-$19,999
___ (3) $11,000-$14,999
___ (4) $8,000-$10,999
___ (5) $7,999 or less
___ (6) I don't know.

33. Check the one statement which best describes the amount of supervision usually received by workers in this occupation.

___ (1) Work without supervision; plan own work; seldom evaluated by others.
___ (2) Supervised weekly; follow overall assignments.
___ (3) Supervised daily; work under supervisor who assigns and schedules work; free to decide details of work.
___ (4) Supervised hourly; activities are directly supervised with little opportunity to act on your own.
___ (5) I don't know.

34. Check the one statement which best describes the future employment prospects for workers in this occupation.

___ (1) Excellent: Strong demand for workers; shortage of qualified people.
___ (2) Good: Steady demand for workers.
___ (3) Fair: Demand limited except in certain geographic areas OR demand is decreasing due to automation or economic conditions.
___ (4) Poor: Little demand, if any; the occupation is very overcrowded, and few jobs are available.
___ (5) I don't know.

35. What college program (major) are you presently enrolled in? ____________

36. What occupation are you preparing for in this program or major? ____________

CAREER GUIDANCE

37. Have you seen a counselor during the last two months? ___(1) Yes ___(2) No

38. If yes, what thing(s) did you discuss?

___ (1) Your values
___ (2) Occupational choice
___ (3) Occupational information
___ (4) Curriculum choice
___ (5) Course selection
___ (6) Chances for success
___ (7) Program approval
___ (8) Family pressures
___ (9) Financial aid
___(10) Other (please explain: ____________)

39. Have you taken or are you presently enrolled in a career guidance course at your college? ___(1) Yes ___(2) No

40. If yes, how would you rate it?

___ (1) Excellent
___ (2) Adequate
___ (3) Poor

41. How do you feel about interacting with a computer for career guidance?

___ (1) Favorable
___ (2) Neutral
___ (3) Unfavorable

42. Are you aware that there is a computerized guidance system (SIGI) on campus? ___(1) Yes ___(2) No

43. If yes, what is your impression of SIGI?

___ (1) Favorable
___ (2) Neither favorable nor unfavorable
___ (3) Unfavorable
___ (4) No impression

44. How did you learn about SIGI?

___ (1) Friends
___ (2) Counselor
___ (3) Posters, Brochures
___ (4) Newspaper
___ (5) Other (please explain: ____________)

45. Do you want to use SIGI? ___(1) Yes ___(2) No

If yes, when? ____________

If no, why not? ____________

PLEASE RETURN THIS QUESTIONNAIRE TO ETS IN THE ENVELOPE PROVIDED.

THANK YOU FOR YOUR COOPERATION.

SIGI EVALUATION QUESTIONNAIRE
FOR COUNSELORS

BACKGROUND INFORMATION

1. What percent of your time do you spend in career counseling (as opposed to personal counseling, academic advisement, etc.)?

___(1) None
___(2) 25% or less
___(3) 25-50%
___(4) 50-75%
___(5) 75-100%

2. On the average, how many students do you see each week for career counseling?

___(1) None
___(2) 1-5
___(3) 5-10
___(4) 10-20
___(5) 20 or more

3. How long are most sessions for career counseling?

___(1) less that 30 minutes
___(2) 30 minutes to an hour
___(3) one to two hours

Please indicate whether you agree or disagree with each of the following statements about computer-based guidance systems.

	Agree	Disagree	Not sure
4. Computer-based guidance systems are a passing fad.	___	___	___
5. Computer-based guidance systems can relieve counselors of many routine duties, leaving more time for professional counseling activities.	___	___	___
6. Computer-based guidance systems are a potential threat to the jobs of counselors.	___	___	___
7. I will probably never make much use of computer-based guidance systems in my work with students.	___	___	___
8. Computer-based guidance systems are capable of helping students make rational career decisions.	___	___	___

EXPERIENCE WITH SIGI

9. Have you attended a SIGI Counselors' Workshop? ___(1) Yes ___(2) No

10. Have you had a chance to use SIGI yourself? ___(1) Yes ___(2) No

11. If so, which of the SIGI subsystems have you been through?

	Once	More than once
(1) VALUES	___	___
(2) LOCATE	___	___
(3) COMPARE	___	___
(4) PREDICTION	___	___
(5) PLANNING	___	___
(6) STRATEGY	___	___

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12. Have you referred students to SIGI? ____(1) Yes ____(2) No

If so, how many?________

For what reasons?____

____

____

____

13. How have most students at your college reacted to SIGI?

____(1) Favorably
____(2) Unfavorably
____(3) No opportunity to observe

14. Have students come to you with their SIGI printouts? ____(1) Yes ____(2) No

What problems, if any, have you had in helping students interpret their printouts?

____

____

____

____

15. Have students come to you with problems related to use of the SIGI terminals?

____(1) Yes ____(2) No

If so, what kinds of problems have they encountered?______________________

____

____

____

____

Prior to having SIGI at your college, to what degree was each of the following (Items 16-22) a problem to you in your role as a counselor?

	Major problem	Minor problem	No problem	Not relevant to me
16. Getting students to read occupational information.	____	____	____	____
17. Keeping up-to-date on occupational information.	____	____	____	____
18. Identifying sources of occupational information.	____	____	____	____
19. Finding time to see all the students who want the help of a counselor.	____	____	____	____
20. Identifying students who need help with their educational and occupational plans.	____	____	____	____
21. Selecting appropriate programs of study for students' career goals.	____	____	____	____

22. Other:______________________

____

____

23. Has SIGI had an impact on any of the above problems? ____(1) Yes ____(2) No

If so, which ones? (Circle responses.) (16) (17) (18) (19) (20) (21) (22)

Please explain:____

____

____

Have you noticed a change in any of the following (Items 24-27) now that SIGI is available to students at your college?

	Increase	Decrease	No change	No opportunity to observe
24. Number of students you are able to see.	____	____	____	____
25. Amount of time you spend doing career counseling.	____	____	____	____
26. Length of career counseling sessions.	____	____	____	____
27. Quality of group discussions about values and career decisions.	____	____	____	____

28. Do you know which of your students have used SIGI and which have not?
____(1) Yes ____(2) No

If so, in your opinion do students who have used SIGI rate higher than students who have not used it in their ability to:

	Yes	No	No opportunity to observe
(1) express clearly the satisfactions they want from an occupation?	____	____	____
(2) state their primary occupational choice?	____	____	____
(3) mention alternative possibilities?	____	____	____
(4) indicate sound reasons for their preference?	____	____	____
(5) show they are well-informed about their first-choice occupation?	____	____	____
(6) decide what programs of study are suitable for each occupation being considered?	____	____	____
(7) evaluate their chances of success in programs being considered?	____	____	____

29. How do you think students should gain access to SIGI? (Check one or more.)
____(1) Terminals should be available to students on a first-come, first-served basis, and follow-up sessions with counselors should be optional.
____(2) Students should be required during their first year of college to use SIGI and schedule a follow-up session with a counselor.
____(3) Counselors should refer students to SIGI and require a follow-up session afterward.
____(4) SIGI should be used as part of a career guidance unit in a classroom course.
____(5) Other:____
____
____

SUGGESTIONS FOR IMPROVEMENT

30. What occupations do students frequently ask about that are missing from SIGI?
____
____
____

31. Are there other additional occupations that you would like to see included in SIGI?
____(1) Yes ____(2) No

If so, please list them:____
____
____

32. Are SIGI's writing style and vocabulary appropriate for your students?
____(1) Yes ____(2) No

If not, what changes would you suggest?____
____
____
____

33. How does the occupational information in SIGI compare to other sources available to students at your college?
____(1) Better
____(2) About the same
____(3) Worse

34. Did you find any sexual, racial, or other bias in SIGI? ____(1) Yes ____(2) No

If so, give examples:____

35. What suggestions do you have for improving SIGI, the Handbook for Counselors, or the Counselors' Workshops?____

OPTIONAL INFORMATION

Members of the SIGI research staff are especially interested in hearing about any personal experiences which you or your colleagues may have had in working with SIGI. Please use the space below to record any observations, amusing anecdotes, students' comments, etc., which you would like to share with us.

Name:______________________________ College:______________________

PLEASE RETURN YOUR QUESTIONNAIRE IN THE ENVELOPE PROVIDED

THANK YOU FOR YOUR COOPERATION

APPENDIX E

SIGI MANAGER'S GUIDE

SIGI
Manager's Guide

System of Interactive Guidance and Information

Version 1.8.3

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PREFACE

The software described in this manual is furnished under a license for use on a single computer system and can be copied (with inclusion of ETS's copyright notice) only for use on such system, except as may otherwise be provided in writing by ETS.

This manager's manual for SIGI contains information necessary for the installation and support of SIGI on standard Digital Equipment Corporation PDP-11/40, 11/45, or 11/70 computer systems, operating under the RSTS/E (Resource Time-Sharing System/Extended) monitor, version 5B-24 or later.

SIGI configuration are all expected to include either a minimum of three RK05 DECpack drives, or at least one RP02, RP03, or RP04 disk drive with an associated TU10 or TU16 magnetic tape system. Inclusion of an RJS04 fixed-head disk as a swapping device will not change the installation procedure.

Features of SIGI or supporting utility programs and specifications for the hardware and system software required to support SIGI are subject to change.

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7.3 SIGI Problems 36

This manual exists on the system disk, in account [40,0], with the file name "SIGI.DOC". It may be printed on any terminal with the system program "PIP", by using the command:

```
PIP <[40,0]SIGI.DOC <CR>
```

If the terminal is turned to off-line mode and advanced to the top of a new page, and then turned back to on-line mode before typing the <CR>, the manual will be properly paged.

Chapter 1

Installing the SIGI System

The SIGI system operates under the PDP-11 RSTS/E Time-Sharing Operating System. SIGI itself consists of a BASIC-language program called "SIGI", a file of interpretive control commands named "*IL", a virtual array named "INIT" which contains switches and specifications for the various SIGI options, and one or more disk files containing the actual SIGI text or "frames" that are displayed on the terminal. In addition, there are a number of support programs and files to collect data, create and manage the student records, check the integrity of the SIGI files, and the like.

1.1 RSTS/E System Generation for SIGI

Instructions for generating the RSTS/E monitor for a specific installation are given in the Digital Equipment Corp. manuals entitled "RSTS/E System Generation Manual" and "RSTS/E System Installation Notes". Purchase of a RSTS/E software license entitles the user to have the RSTS/E monitor installed the first time by Digital Equipment Corporation software specialists. Thereafter the user is responsible for creation and installation of updates, corrections, or revised versions of RSTS/E and/or system support programs, although local Digital Equipment Corp. software support specialists remain available for consultation as required.

In creating the RSTS/E monitor for use with SIGI, the following points should be observed:

1) ALL console terminal dialogue, load maps, listings, and printouts created during the RSTS/E system generation should be retained. These may be required if problems arise later. It is suggested that all of these materials be placed in a common file, or punched and filed in a single notebook for easy reference.

2) In answering the configuration questions at the beginning of the RSTS/E system generation procedure, note the following:

   a) SIGI uses neither pseudo-keyboards nor multi-tty service, and so these options need only be selected if they will be needed for other purposes, such as running BATCH.

   b) An adequate number of small buffers is essential to maintain reasonable SIGI response time. Under no circumstances should less than 10 small buffers per job be allocated.

   c) Receivers are not required by SIGI, and so need be allocated only if required for other programs, such as SPOOL.

   d) FIP buffering should be included.

   e) Except for very small systems, running only SIGI and supporting no more than 2-3 SIGI terminals, resident disk handling should be included. On systems supporting more than 5-6 SIGI terminals, resident system call dispatch should also be included. There is no reason, for SIGI support, to ever include resident send/receive or resident directory lister.

   f) 2-word math precision is all that is required by SIGI, and all that is recommended. 4-word precision may be requested if other applications will require it, but this will increase the size of the SIGI program, and of all other programs, and may require an increase in the system memory size.

   g) The extended functions are not needed by SIGI, and may be omitted. However, if RSTS/E will be used for any other purposes, the functions are highly likely to be required, and so should be included.

   h) PRINT USING is not required by SIGI.

   i) The MATRIX functions are not required by SIGI.

   j) ROLLIN should be included, as it will be required for the creation and maintenance of backup materials.

3) ALL relevent monitor and system program patches should be installed. Be sure to maintain the console printout created during patching, so that a record exists of the patch space used.

4) In REFRESH, observe the following:

a) The RSTS.CIL size should be increased 20 to 40 blocks over its minimum required size to allow for later expansion of the operating system.

b) Be sure to allocate adequate swap space for the maximum number of jobs at 16k words per job, as the SIGI program occupies 16k per user.

c) In systems with fixed-head swapping disks, place OVR.SYS and ERR.SYS on the swapping disk, along with SWAP0.SYS.

d) In systems without swapping disks, be sure to position the active system files SATT.SYS, SWAP0.SYS, OVR.SYS, and ERR.SYS in the center of the system disk. Failure to do this will degrade SIGI response time.

5) In DEFAULT the maximum job size must be increased from 8k to 16k, as SIGI is a 16k job that will run in a non-privileged user account.

6) For PDP-11/45 systems with bipolar or MOS memory, the LOCATE option in DEFAULT should be used to position the BASIC-PLUS run-time system within the high-speed memory area.

1.2 SIGI Account Numbers

In RSTS/E every user account is identified by a project number (1-254) and a programmer number within that project (0-254). All accounts with project number 1 are considered privileged, and users in these acounts have full access to all system facilities. In general privileged accounts should only be available to the system manager and others who maintain the system.

For proper operation, SIGI must be assigned a project number of its own. Automatic SIGI installation and updating programs will assume that this is project 40. Users may assign a different project number to SIGI if they wish, but they will then have to edit all unpdate control files, SIGI manager's guides, and SIGI user guides suppiled by ETS to reflect this change. Users are strongly urged to retain project 40 for SIGI use.

Under project 40, SIGI will use programmer number 0 as the SIGI library account. Account [40,0] will contain the interpreter control file "RIL.INT", which will be used by all SIGI users on the system.

Programmer numbers 1-254 can be assigned to various classes of SIGI users if desired. Each account will contain its own copy of the SIGI initialzation matrix "INIT.MAT", so that users on different SIGI accounts can have different SIGI options set. For example, SIGI users in account [40,1] might have local terminals set to operate at 2400 baud, while users in account [40,2] might access SIGI over telephone lines, and so need to have the terminal speed set to 1200 baud. Or a single PDP-11 system may be serving several different schools, each with its own student record file. In that case, each school would have a separate programmer number under project 40, and the "INIT.MAT" file in each account would point to a different student record file.

1.3 SIGI Operating Programs and Files

For SIGI to operate correctly, the following programs and files must be loaded:

In Account [40,0]

SIGI .BAC - The SIGI interpreter, stored with a protect code of <248>.

RIL .INT - The interpretive code read by SIGI.BAC, stored with a protect code of <56>.

SUMARY.DAT - Summary data collection file, created by program MAKSUM.BAS. Collects data across users for ETS monitoring purposes. Stored with protect code of <48>.

RECORD.BAC - The student record management program. Stored with protect code of <112>. If there are several student record files on the system, each copy of RECORD must be edited to point to the correct file for the account under which it is loaded.

In Each SIGI User Account: [40,1], [40,2], etc.

INIT .MAT - The SIGI initialization array, created by program MAKINT.BAS after editing to reflect the requirements of users in this account. Stored with protect code of <60>.

In addition to these programs, three disk files must exist, These are:

1) The SIGI Frames Disk A, containing the SIGI frames common to all systems. On RK05-based systems this will be a non-file-structured disk pack occupying RK05 drive 1. On RP-based systems, this will be a file in account [40,0] named "DISKA.DAT".

2) The SIGI Frames Disk B, containing the school-specific frames for PREDICTION and PLANNING. On RK05-based systems this will occupy about one-half of a disk pack on drive 2, as a file in account [40,0] named "SIGIB.DAT". On RP-based systems it will also exist with that name under account [40,0]. Schools without the full PREDICTION and PLANNING system will not have this file.

3) One or more student record files, each stored under the SIGI account under which it is to be used, and named "STUDFL.SGD". On RK05-based systems, these files will typically be stored on the remainder of the pack on drive 2. The STUDFL.SGD file is created with the program "STRBLD.BAS".

1.4 Installing SIGI

SIGI is installed on an operating RSTS/E system by means of a program named "UPDATE.BAS", which performs a series of transfers under the direction of an associated control file. The "UPDATE" program is also used to update SIGI from time to time. Instructions for running "UPDATE.BAS" to install or update SIGI will be included with each installation or update package.

Chapter 2

RSTS/E Operation

RSTS/E start-up and shut-down are largely under automatic control. Start-up is initiated by mounting the RSTS/E system disk on drive 0, and then initiating from the console switches the execution of a small program stored in permanent read-only memory. This program "bootstraps" the system by reading in and executing a start-up sequence from the system disk. The start-up sequence asks the operator a few questions, such as the current time and date, and then prepares the system for time-sharing operation.

System shut-down is controlled by a program called "SHUTUP", which brings the system to an orderly halt, ensuring as it does so that all files are left in an intact state and that the system is in general prepared for the next start-up. It is essential that the system be halted only via the "SHUTUP" routine.

2.1 RSTS/E Start-up Procedure

A) Apply power to the PDP-11 system by inserting the key in the power switch (at the lower left-hand side of the processor console) and rotating it clockwise to the "POWER" position. Be careful not to rotate it past this position to the "LOCK" position, as the console switches would then be inoperative. Console indicators should light when power is applied. If they do not, check that the main circuit breakers for the system have not been tripped and that the system power cords are securely fastened to their wall sockets.

B) Load the RSTS/E system disk onto disk drive 0 and set the "LOAD/RUN" switch to "RUN". Ensure that the "RDY" (Ready) indicator is lighted and the "WT PROT" (Write Protect) indicator is off before proceeding. If "WT PROT" is lighted, press the "WT PROT" switch to extinguish it.

C) Refer to Appendix A of the "RSTS/E System Manager's Guide" (DEC-11-ORSMD-A-D) for instructions on bootstrapping the system. The exact procedure will depend upon which of several bootstrap devices is installed, and whether the system disk is an RK05 disk cartridge, or one of the RP disk systems (RPR02, PR03, or RP04).

D) For RK05-based systems ONLY, mount the disk cartridge labeled "SIGI Pack A" into drive 1. Set the "LOAD/RUN" switch to "RUN". Ensure that the "READY" indicator is lighted, and "WT PROT" is off. Repeat the procedure on drive 2 with the cartridge labeld "SIGI Pack B". This procedure is unnecessary in RF-based systems, as the required files are carried on the system disk.

E) For RK05-based systems ONLY, protect the disk cartridge on drive 1 by setting the drive 1 "WT PROT" (write protect) on. This is accomplished by pressing the "WT PROT" switch on the drive to light the "WT PROT" indicator. Only drive 1 should be write-protected; the "WT PROT" indicator on drive 2 should NOT be on.

F) In the sample dialogues that follow, the text printed by the computer is underlined to distinguish it from that entered by the user. Each line is ended by pressing the key labeled "CR" (the same key is labeled "RETURN" on the Delta Data keyboard). Typing errors may be corrected, before the <CR> key is pressed, by typing the "RUBOUT" key once for every erroneous character to be deleted.

To start RSTS/E up, initiate the following dialogue on the console typewriter:

```
OPTION: START <CR>
-------

JOB MAX OR SWAP MAX CHANGES? NO <CR>
--- --- -- ---- --- --------
ANY MEMORY ALLOCATION CHANGES? NO <CR>
--- ------ ---------- --------
CRASH DUMP? YES <CR>
----- -----

DD-MMM-YY 6-MAR-75 <CR>          (current date)
---------
HH:MM 9:21 <CR>                  (current time)
-----

SYSTEM INITIALIZATION PROGRAM
------ -------------- -------
COMMAND FILE NAME? <CR>
------- ---- -----
```

```
RUN $ERRCPY       (Text here may vary depending on the
--- -------
READY              contents of the "START.CTL" file for
-----
ERRCPY V05-06      this installation.)
------ ------
DETACHING
---------
```

System initialization may take several minutes, but it is complete once the "ERRCPY" program prints the "DETACHING" message on the console printer. At this point users may log into the SIGI account as described in Chapter 3.

G) Now set the console switches 0 - 17 all in the "UP" position. This will condition RSTS/E to attempt an automatic recovery in case of a system crash. If desired, the console power switch key can be rotated clockwise to the "LOCK" position and then removed. This will leave the control switches inoperable, and so protect the system from errors generated by accidently or deliberately pressing computer console switches.

To halt the system, follow the procedure described in section 2.2 below.

```
************************************************************
*                                                          *
*  UNDER NO CIRCUMSTANCES SHOULD THE PROCESSOR BE HALTED  *
*  MANUALLY. TO BRING THE SYSTEM TO A HALT, FOLLOW THE    *
*  "SHUTUP" PROCEDURE DESCRIBED IN SECTION 2.2. FAILURE   *
*  TO FOLLOW THIS PROCEDURE MAY LEAVE DISKS AND FILES IN  *
*  AN UNREADABLE FORM.                                     *
*                                                          *
************************************************************
```

2.2 RSTS/E Shut-down Procedure

A) The RSTS/E utility program "SHUTUP" initiates an orderly shut-down of the time-sharing process. This program must be run under a privileged account number and from the console typewriter. If the console typewriter is already logged into a privileged account, proceed to step (B) below. Otherwise, log into account [1,2] as follows:

```
<CTRL>C                                  (Line a)

HELLO 1/2 <CR>                           (Line b)
PASSWORD: SYSLIB <CR>                    (Line c)
---------
JOB(S) 1 2 3 ARE DETACHED UNDER THIS ACCOUNT
------ - - - --- -------- ----- ---- -------
JOB NUMBER TO ATTACH TO? <CR>
--- ------ -- ------ ---
3 OTHER USER(S) ARE LOGGED IN UNDER THIS ACCOUNT
- ----- ------- --- ------ -- ----- ---- -------


READY
-----
```

The "<CTRL>C" in line (a) above ensures that control has been returned to the RSTS/E monitor from the program (if any) last entered. The "HELLO 1/2" command initiates a login to account [1,2]. If the user is currently logged into another account, the "HELLO" command will automatically log out of that account before logging into account [1,2]. As with all passwords, the system will not echo the password "SYSLIB" to the terminal, and will refuse entry to account [1,2] if the password is entered incorrectly.

In line (b) above, notice that the slash "/" is used in specifying the account number (e.g.: [1/2]). If the comma is used between the two portions of the account number, system notices are printed out on entry to the account. Use of the slash bypasses this step.

B) Start the utilty program "SHUTUP" as follows:

```
<CTRL>C
READY
-----

RUN $SHUTUP <CR>
AUTOMATIC SYSTEM SHUTDOWN PROGRAM
```

```
HOW MANY MINUTES UNTIL SYSTEM SHUTDOWN? 5 <CR>
--- ---- ------- ----- ------ ---------
HOW MANY MINUTES BETWEEN WARNING MESSAGES? 1 <CR>
--- ---- ------- ------- ------- ---------
```

In the responses above, users have been given 5 minutes to finish up their work and log out. The system will wait 5 minutes, printing a warning message to each active terminal once per minute, and will then initiate the shutdown procedure. If the operator knows that there are no active users on the system, an immediate shutdown can be initiated by simply replying "0" to the two queries above.

There will now follow a number of advisory messages, ending finally with the message:

```
ALL SET TO PROCEED WITH SYSTEM SHUTDOWN
--- --- -- ------- ---- ------ --------

PLEASE WAIT FOR THE COMPUTER TO ACTUALLY 'HALT'
------ ---- --- --- -------- -- -------- ------
WHEN IT DOES, PRESSING 'CONT' WILL BOOT BACK RSTS/E
---- -- ----- -------- ------ ---- ---- ---- ------
```

To determine if the PDP-11 has actually stopped, find the six lights on the processor console under the "PDP-11" logo. The processor is halted if the four on the left labeled "RUN", "BUS", "PROC", and "CONSOLE" are all lighted simultaneously.

C) To finish closing down the system, set the "LOAD/RUN" switch on each of the disk drives to the "LOAD" position. Disks can be stored in the drives until the next start-up. However, if they are to be removed, wait until the drive "LOAD" light comes on, and then remove the disk. The drive door will not open until the "LOAD" light is on, nor will it open unless there is power in the system.

Now insert the power switch key (if it has been removed) into the console power switch, and turn it counter-clockwise to the "OFF" position.

D) Be sure the Delta Data terminals, and any other terminals connected to the system, are turned off. Also be sure the Texas Instrument printers attached to each SIGI terminal are turned off.

Chapter 3

Running SIGI

SIGI runs as a user program in account [40,1], under the RSTS/E (Resource Time-Sharing System/Extended) operating system. To run SIGI, one must first have a SIGI ID number, assigned by the "RECORD" program (see Chapter 4), or one must use one of the SIGI demonstration numbers (ID numbers 1 through 9).

If the PDP-11 RSTS/E system is not running, follow the directions in Chapter 2 before proceeding. If the system is running, proceed as follows:

3.1 Checking the SIGI terminal

Before the Delta Data terminal can communicate with RSTS/E, it must be turned on and set to the proper operating mode. If the terminal is already in use, proceed to section 3.2 below. Otherwise, follow the steps listed:

A) Located under the front edge of the terminal is an "ON/OFF" switch. Turn this to "ON". Some lights should come on in the small indicator panel to the right of the screen. If this does not occur, check that the terminal power plug is securely into its wall socket.

B) Also under the front edge of the terminal keyboard is a switch labeled "LOCAL/ON-LINE". Turn this switch to the "ON-LINE" position.

C) On the rear of the terminal are a series of rotating switches that should not normally need to be reset. In case of trouble, check that these are set correctly, as follows:

PARITY - NONE

DUPLEX - ECHO

BELL - OFF

SPEED - 1800

Use care in setting the "SPEED" switch, as it is quite easy to set it to one side or the other of the desired speed. If this occurs, the messages on the screen will be incoherent.

D) The Delta Data terminal cannot communicate with RSTS/E unless it is conditioned to send keypresses to the PDP-11. This is accomplished by typing "RESET", and then holding the "CTRL" key down while pressing the "MODE" key, to put the terminal into "TTY" mode. These keys will be found among the dark colored control keys along the top of the keyboard.

In general the "CTRL" (Control) key acts as a form of "Shift". On dark function keys that have two functions marked, the upper function will be executed if the "CTRL" key is being held down while the function key is pressed; otherwise the lower function will be executed. (eg. "<CTRL>MODE" sets the terminal to "TTY" mode, while "MODE" alone sets it to "TYPE" mode.)

E) If the terminal is prepared to communicate with RSTS/E, the indicator panel to the right of the screen should have "ON-LINE" and "TTY" lighted. "ALARM" may or may not be lighted; in this application it does not matter. If "FORMAT" is lighted, press "<CTRL>FORMAT" to turn it off. If "INSERT" is lighted, press "<CTRL>INSERT" to turn it off.

F) On the Texas Instrument printer associated with the Delta Data Terminal, turn the "POWER" switch to "ON". The red power indicator next to the switch should light. If it doesn't, check that the printer line plug is securely inserted into the wall socket. Be sure the "ON-LINE/OFF" switch on the printer is set to "ON-LINE".

3.2 Logging into the SIGI account

To run SIGI, the user must first identify him/herself to RSTS/E as a legitimate user of programs in the SIGI account. This is done by "logging in" to the system from the SIGI terminal.

If you are already logged into account [40,1], proceed directly to section 3.3 below. Otherwise, log in with the following dialogue. The text printed by the computer is underlined to distinguish it from that entered by the operator. End each line by pressing the key labeled "CR" (the same key is labeled "RETURN" on the Delta Data keyboard). Errors may be corrected, before "CR" is typed, by typing "RUBOUT" once for each character to be deleted, or type <CTRL>U (hold the "CTRL" key down while typing the letter "U") to start the whole line over again.

```
HELLO 40/1 <CR>
PASSWORD SIGI <CR>          (Line a)
--------

READY
-----
```

RSTS/E will not echo the password "SIGI" typed in at line (a) above. If the password is entered incorrectly, RSTS/E will so advise the user.

3.3 Starting SIGI

To start SIGI, once the user is logged into account [40,1], simply type the following:

```
RUN #SIGI <CR>                            (Line a)


SIGI - VERSION 1.8.3
---- - ------- -----
STUDENT NUMBER? 1323                      (Line b)
------- -------
```

Note that the name of the program entered in line (a) above is "#SIGI", with a leading "#" sign. This advises RSTS/E that it is to look for the program "SIGI" in the SIGI Library Account, rather than in account [40,1]. In line (b), enter the assigned SIGI ID number. If the incorrect number is entered, an error message will be typed and control will return to the RSTS/E monitor.

Before students can use SIGI, they must be assigned a SIGI ID number by the "RECORD" program (see Chapter 4). For occasional visitors, training, and/or demonstrations it is useful to have some numbers which can be used without passing through the "RECORD" program. SIGI reserves numbers 1 through 9 for this purpose. No name need be entered to use these numbers, simply enter the number in response to the "STUDENT NUMBER?" query.

3.4 Halting SIGI

SIGI users are given an opportunity at the end of each logical section of the SIGI program to exit from SIGI. Users are strongly urged to exit from SIGI in this manner, as this leaves the data files correctly set for the next time one returns to SIGI. It may occasionally be necessary to terminate a SIGI session before reaching one of the regular exit points. In this case, typing <CTRL>C (hold the "CTRL" key down while typing the letter "C") will abort the program. An error message will appear on the screen, and will be transferred to the printer, and then control will be returned to the RSTS/E monitor.

Users who exit in this manner may find on returning to SIGI at a later time that they will be forced to repeat the section they were in at the time they aborted the SIGI program.

3.5 Logging out of the SIGI account

When SIGI operation is finished for the day, or if the terminal is to be used for a non-SIGI function, users may log out of the SIGI account [40,1] by ensuring they are in RSTS/E command mode (type <CTRL>C and wait for the "READY" response to ensure that the system is in command mode), and then typing "BYE F <CR>".

Chapter 4

Managing the Student Files

SIGI maintains information about each user in a file named "STUDFL.SIG" on SIGI Disk B. Each user has a 170-character data block in this file in which SIGI stores data that will be required should the user return to SIGI at a later time. Before a student can use SIGI, he or she must be assigned a SIGI number and allotted a record area. The SIGI utility program "RECORD" is provided for this purpose.

4.1 Starting the "RECORD" program

A) If you are already logged into account [40,1], proceed directly to step (B) below. Otherwise, log in with the following dialogue. The text printed by the computer is underlined to distinguish it from that entered by the operator. End each line by pressing the key labeled "CR" (carriage return). In case of errors, type "RUBOUT" once for each character to be deleted, or type <CTRL>U (hold the "CTRL" key down while typing the letter "U") to start the whole line over again.

```
HELLO 40/1 <CR>
PASSWORD SIGI <CR>                (Line a)
--------
READY
-----
```

In line (a) above, the password "SIGI" will not be echoed at the terminal. If the incorrect password is entered, or if an error is made in entering the password, RSTS/E will so advise the user.

B) Ensure that the disk cartridge labeled "SIGI Pack B" is mounted on disk drive 2, that the "LOAD/RUN" switch is set to "RUN", that the "RDY" indicator is ON, and the "WT PROT" indicator is OFF. If the disk is not already mounted and in use, it will be necessary to use the "MOUNT" command as follows to advise RSTS/E that the disk is available:

```
MOUNT DK2:SIGI <CR>

READY
-----
```

The "RECORD" program can be run from one or more terminals concurrently, and can be run while SIGI is in use on other terminals. Special code allows "RECORD" to modify the file "STUDFL.SIG" even while other programs are accessing the file.

C) Start the "RECORD" program by typing the following:

```
RUN $RECORD <CR>

RECORD - SIGI STUDENT RECORD MANAGER
------ - ---- ------- ------ -------
VERSION X.XX
------- ----

AUTHORIZATION?                      (Line a)
--------------

FUNCTION?
---------
```

In line (a) above, the user must respond with the authorization word, followed by a <CR>. The authorization word will not be echoed on the terminal, and if it is not correct, control will return to the RSTS/E monitor (indicated by the "READY" response"), rather than being passed to the "RECORD" program (indicated by the "FUNCTION?" response). The authorization procedure ensures that students and other users cannot enter the "RECORD" program and create or delete student files. Only those authorized to manage student records ought to know the word.

At this point the "RECORD" program is awaiting a command from the user. If the file "STUDFL.SIG" cannot be found on disk 2 under the current account, or if disk 2 is not mounted, the program will advise the user of this fact and then return to the RSTS/E monitor. If this should occur, check that you logged in under account [40,1], and that the disk cartridge labeled "SIGI Pack 2" is mounted on disk drive 2.

4.2.1 Help in using RECORD

The function "HELP" is provided in case the user needs help in recalling the valid function names. This function is called as follows:

```
FUNCTION? HELP <CR>
---------
```

"RECORD" will now print out a table of the valid function calls, and will remind the user that only the first two characters need be typed (e.g. "HE" will work as well as "HELP").

4.2.2 Entering new students into SIGI

To enter a new student into the SIGI system, respond to the "FUNCTION?" query with the command "ENTER" (or just "EN"), as follows:

```
FUNCTION? ENTER <CR>
---------

ENTER STUDENT NAME, LAST NAME FIRST:
----- ------- ----- ---- ---- ------
? DOE, JANE L. <CR>                          (Line a)
-
NAME - DOE, JANE L.                          (Line b)
---- - ---- ---- --
CONFIRM (Y OR N)? Y <CR>                     (Line c)
------- -- -- ---

STUDENT SIGI NUMBER IS 1036                  (Line d)
------- ---- ------ -- ----
3876 FREE RECORDS REMAIN                     (Line e)
---- ---- ------- ------
```

In line (a) above, "RECORD" accepts student names of up to 32 characters length. Names longer than 32 characters will be truncated, and a message will by typed to warn the user of this fact. It is important to enter the student's last name first, as future versions of this program will provide for alphabetic listings of students and their SIGI numbers, based on the assumption that the last name is first.

In line (b) the name is echoed, to allow the user to check it, and then line (c) requests that the user confirm that the form is correct. Any answer other than "Y" will return the user to the "FUNCTION" query, so that the name can be re-entered. The response "Y" enters the name and assigns a SIGI number, which is printed in line (d). This number must be used to enter SIGI, or to modify this student's record with the "CORRECT" or "DELETE" functions in this program.

4.2.3 Correcting names in student files

The initial dialogue in SIGI provides an opportunity for students to check the spelling of their names. Should a student report that his or her name is misspelled, the "CORRECT" function may be used to insert the corrected spelling into the student's SIGI file. Reply to the "FUNCTION?" query as follows:

```
FUNCTION? CORRECT <CR>
---------
ENTER SIGI NUMBER ? 1036 <CR>
----- ---- ------ -
NAME ENTERED AS - DOE, JANE L.                     (Line a)
---- ------- -- - ---- ---- --

ENTER CORRECTED NAME BELOW, LAST NAME FIRST:
----- --------- ---- ------ ---- ---- ------
<RETURN> ALONE WILL LEAVE IT UNCHANGED
-------- ----- ---- ----- -- ---------
? DOE, JAINE L. <CR>                               (Line b)
-

NAME - DOE, JAINE L.                               (Line c)
---- - ---- ----- --
CONFIRM (Y OR N)? Y <CR>                           (Line d)
------- -- -- ---
```

In line (a), the name is printed as it is currently stored in the student's file. If the user wishes to leave the name untouched, pressing the "RETURN" key will abort the request and return to the "FUNCTION?" query. In line (b), the user retypes the name in its corrected form. The program then re-echoes the corrected name for a final check in line (c), and asks the user to confirm that all is well. Any answer other than "Y" will leave the original name unchanged. The response "Y" will cause the program to replace the previous name field with the new one just entered. The student's SIGI number remains the same as before.

4.2.4 Deleting student files

SIGI files that are no longer in use can be recovered and reassigned to new students. This is accomplished with the "DELETE" function, as follows:

```
FUNCTION DELETE <CR>
--------
ENTER SIGI NUMBER ? 1036 <CR>
----- ---- ------ -
NAME IS - DOE, JAINE L.                        (Line a)
---- -- - ---- ----- --
DELETE THIS FILE (Y OR N)? Y <CR>              (Line b)
------ ---- ---- -- -- ---
```

The name associated with the SIGI number is typed in line (a) to ensure that the correct record is being deleted. If the response in line (b) is "Y" the record is deleted. Any other response will leave the record intact.

4.2.5 Resetting demonstration files

SIGI numbers 1 through 9 are reserved for demonstration purposes, and need not be initialized with the "ENTER" function before being used. However, after use they may be reset for a new user with the "RESET" function, as follows:

```
FUNCTION? RESET <CR>
---------
DEMO NUMBER? 5 <CR>
---- -------
STATUS? 3 <CR>                           (line a)
-------
```

The demonstration file selected will be set to the status entered at line (a) above, and data from a simulated student (eg. values weightings, occupations already seen, etc.) will be inserted into the record if required. Section 4.2.6 below describes the meaning of the eight status levels (0-7). This function differs from the "DELETE" function in that it does not affect the student name (which is always "DEMONSTRATION NO. X" for a demonstration file) or the number (which is always in the range 1 to 9 for a demonstration file).

4.2.6 Listing active records and student numbers

"RECORD" provides for the generation of lists of active SIGI records. The current version of the program only lists records in numeric order; later versions will include an alphabetic listing feature as well. It is important that student names be entered last name first, so that the alphabetic list function, when installed, will work correctly.

To generate a listing of all records active in the student record file, proceed as follows:

```
FUNCTION NLIST <CR>
--------
ADVANCE PRINTER IN OFF-LINE MODE TO TOP OF NEW PAGE
------- ------- -- -------- ---- -- --- -- --- ----
PUT ON-LINE AND TYPE <RETURN> TO START LISTING
--- ------- --- ---- -------- -- ----- -------
TYPE <CTRL>C AT ANY TIME TO ABORT THE LISTING
---- ------- -- --- ---- -- ----- --- -------
?
-
```

The instructions printed above assume that the list is being produced on a hard-copy terminal, such as the console printer. They allow the user to position the paper correctly before beginning the listing. If for any reason the listing is aborted with the <CTRL> C command, control will return to the RSTS/E monitor, and the user will have to restart "RECORD" as described in section 4.1 above.

The printed list will contain each active user's name and SIGI ID number, the date SIGI was first used (or "NEW" if the student has had a file created, but has not yet been on the system), the date SIGI was last used by the student, and the "STATUS" count, which indicates how much of SIGI each student has seen. These are interpreted as follows:

STATUS

0 - New student, who has never been on SIGI

2 - Seen Intro. and Values only

3 - Seen Intro., Values, and Locate only

4 - Seen Intro., Values, Locate, and Compare only

5 - Seen Intro., Values, Locate, Compare, and Prediction only

6 - Seen Intro., Values, Locate, Compare, Prediction, and Planning only

7 - Seen all parts of the system, including strategy, and is now free to return to any parts at will.

4.2.7 Checking number of free records remaining

The function "FREE" lists the number of free records remaining in the SIGI file "STUDFL.SIG", as follows:

```
FUNCTION FREE <CR>
--------
3875 FREE RECORDS REMAIN
---- ---- ------- ------
TOTAL FILE SIZE IS 4000
 --- ---- ---- -- ----
```

4.2.8 Searching for student name

Replying "SEARCH" to the function query will initiate a search for all students with a specified last name, as follows:

```
FUNCTION SEARCH <CR>
--------
LAST NAME FOR WHICH TO SEARCH: XXXX <CR>
---- ---- --- ----- -- -------
```

This command will initiate a search for all students whose last names are XXXX. For this function to work properly, student names must all have been entered with the last name first, and must be separated by any first or middle names or initials by either a space or a comma.

4.2.9 Running SIGI from RECORD

Control can be passed to "SIGI" directly from "RECORD" by simply responding to the "FUNCTION?" query with "SIGI <CR>".

4.2.10 Exiting from the RECORD Program

Control can be returned to the "STS/E monitor from "RECORD" by responding to the "FUNCTION?" query with "QUIT <CR>". "STS/E will acknowledge this by replying "READY".

Chapter 5

Backup Procedures: RK05-Based Systems

There always exists the possibility that a hardware failure or operator error will erase or overwrite some portion of the SIGI disk cartridges, or of the RSTS/E system disk cartridge. The cartridge labeled "SIGI Pack A", which runs on disk drive 1, is run with the write-protect option enabled, and so is normally protected from such errors. If, in spite of this, it should be destroyed it can be recreated by copying directly from the original distribution pack, as described in section 5.2.

Neither the "RSTS/E system cartridge, mounted on drive 0, nor the disk cartridge labeled "SIGI Pack B", mounted on drive 2, can be protected by the write-protect feature, as both require write operations. As "SIGI Pack B" contains student records, which are updated every time a new student name is entered or a student uses SIGI, it cannot be regenerated from the original distribution pack without the loss of all accumulated student data. To provide adequate backup for this disk, then, it is necessary to make periodic copies of the working "SIGI Pack B". If the working copy is destroyed or overwritten, the only data lost will be that added to the student record file since the last backup copy was made. Under normal conditions generation of a backup copy at least once per week is probably adequate. If experience shows that errors occur fairly frequently then backups can be generated more often.

For much the same reasons it is advisable to maintain a backup copy of the RSTS/E system disk cartridge, so that it will not be necessary to repeat the entire system generation process should the working copy be corrupted.

5.1.1 Creating a backup copy of the student files

The disk cartridge labeled "SIGI Pack B" contains school-specific SIGI text frames (if there are any for this school), and the student record file. The text frames do not change, and so can always be recovered from the "SIGI Backup Pack B" which was created when SIGI was first installed. The recovery procedure is described in section 5.1.2 below.

The student files, however, change every time a student uses SIGI, and so the backup copy of the student file maintained on "SIGI Backup Pack B" must be updated from time to time. Should it be necessary to recreate the working copy of the student file from the backup copy, SIGI will not be aware of any activity that has taken place since the last backup copy was made. Thus backup copies of the student file should be made often enough that not too much is lost if it must be recreated. Installations might consider making backups of the student file once a week in the beginning, modifying this schedule as experience accumulates.

To update the backup copy of the student files, proceed as follows:

A) If RSTS/E is not running, follow the directions in section 2.1 to start the system up. If the system is already running, ensure that no students are currently using SIGI.

B) Ensure that the disk cartridge labeled "SIGI Pack B" is mounted on disk drive 2, with the "LOAD/RUN" switch set to "RUN" and the "WT PROT" indicator off. If SIGI has been running, this will already be the case. If this disk is not already mounted in drive 2, it will be necessary to mount it, and when the drive "RDY" indicator comes on to issue the following command (from any account):

```
MOUNT DK2:SIGIB <CR>

READY
-----
```

The "MOUNT" command advises RSTS/E that the disk is available for use.

C) If the cartridge labeled "SIGI Pack A" is still mounted in drive 1, set the drive 1 "LOAD/RUN" switch to "LOAD", wait until the drive 1 "LOAD" indicator comes on (about 1 minute), and then remove the cartridge.

Note that the cartridge labeled "SIGI Pack A" is the ONLY cartridge used by this system that can be removed without first issuing the "DISMOUNT" command. This is because it is not organized according to the RSTS/E file structure, but rather according to an absolute block system. Removal of "SIGI Pack B" without the "DISMOUNT" command, while RSTS/E is running, will result in errors next time the disk is mounted. In that case the "CLEAN" command will have to issued (see the RSTS/E System Manager's Guide, section 6-14). However, disks can be removed after RSTS/E has been stopped with the "SHUTUP" program, because "SHUTUP" dismounts all disks before halting the system.

D) Mount the disk cartidge labeled "SIGI Backup Pack B" into drive 1. Set the "LOAD/RUN" switch to "RUN", and ensure that the "WT PROT" indicator is off. If "WT PROT" is on, turn it off by pressing the "WT PROT" switch on drive 1.

E) If not already in account [40,1], log into that account as follows:

```
        HELLO 40/1 <CR>
        PASSWORD SIGI <CR>                    (Line a)
        --------

        READY
        -----
```

As always, the password "SIGI" in line (a) will not be echoed at the terminal.

F) Now advise RSTS/E that the disk on drive 1 is available by issuing the "MOUNT" command as follows:

```
        MOUNT DK1:SIGID <CR>

        READY
        -----
```

G) As there is always a possibility of copying the wrong way (from the backup copy to the original) if the command in step (H) below is typed incorrectly, the working copy of "SIGI Pack 8" on drive 2 should now be write-protected by pressing the "WT PROT" switch to light the "WT PROT" indicator on drive 2.

H) Run the program "BACKUP" by typing the following dialogue:

```
        RUN $BACKUP <CR>                      (Line a)
        FILE BACKUP  V05-23
        ---- ------  ------

        # DK1:<DK2:STUDFL.SIG/S               (Line b)
        -

        TRANSFER COMPLETE XXX BLOCKS IN 1 FILES
        -------- -------- --- ------ -- - -----

        # <CTRL>C                             (Line c)
        -
```

In line (a) above note that a dollar sign is typed before the program name "BACKUP" to advise RSTS/E that this program is in the system library account [1,2], raather than in the SIGI account [40,1]. In line (b), be especially careful to type the command as shown, so that copying will proceed from disk 2 to disk 1, rather than the other way. The characters "/S" at the end instruct "BACKUP" to overwrite the previous backup copy of "STUDFL.SIG".

The backup process may require several minutes, depending upon the size of the student file. "BACKUP" will type out the completion message when finished, followed by another "#" sign. Typing <CTRL>C at this point (hold the key labeled "CTRL" down while typing the letter "C") will return the user to the RSTS/E monitor.

I) Now dismount the backup disk on drive 1 with the command:

```
READY
-----

DISMOUNT DK1:

READY
-----
```

The "LOAD/RUN" switch on drive 1 can now be set to "LOAD", and when the "LOAD" indicator lights the "SIGI Backup Pack B" cartridge can be removed and returned to storage. Backup disks should be clearly marked as such, and should be stored where there is no chance that they will be used by mistake for other purposes.

5.1.2 Regenerating "SIGI Pack B" from the backup

"SIGI Pack B" contains the school-dependent Prediction and Planning information, and the student record files. Should the working copy of "SIGI Pack B" become unusable for any reason, it may be recreated by copying the contents of "SIGI Backup Pack B" onto it. "SIGI Backup Pack B" itself should never be used with SIGI, however, as there is alwasy the danger that the same error - operator or hardware - that destroyes the working copy would destry the backup as well. Therefore the backup is ONLY used to make new working copies. To do this, proceed as follows:

A) If RSTS/E is halted, follow the instructions in section 2.1 to start the system. If RSTS/E is running, follow the instructions in section 2.2 to halt it, and then press the "CONT" switch on the computer console switch register to bring the system to the "OPTION:" query.

B) Mount "SIGI Pack B" into drive 2, and "SIGI Backup Pack B" into drive 1. Set the "LOAD/RUN" switches on both drives to "RUN", and set "WT PROT" on drive 1 by pressing the "WT PROT" switch on that drive. Wait for the "RDY" indicator to light on both drives.

```
**************************************************************
**                                                          **
**  BE SURE THAT DRIVE 1 CONTAINS THE BACKUP PACK,          **
**  AND THAT DRIVE 1 IS WRITE-PROTECTED TO PROTECT          **
**  THE BACKUP COPY FROM ACCIDENTAL ERASURE.                **
**                                                          **
**************************************************************
```

C) Load the "ROLLIN" program with the following dialogue on the console typewriter:

```
OPTION: LOAD <CR>
-------
LOAD PROGRAM: ROLLIN <CR>
---- --------

ROLLIN VXX
------ ---
# DK2:/FO<DK1:/WL/VE
-
```

D) The "ROLLIN" routine will be completed when the console writer returns another "#" sign, indicating that it is ready for a new command. At this point set the drive 1 "LOAD/RUN" switch to "LOAD", and when the "LOAD" indicator comes on in a minute or so, remove the "SIGI Backup Pack B" from drive 1 and return it to storage. "SIGI Pack B" in drive 2 now contains a copy of the backup pack, and SIGI operation can be resumed by setting the "ENABLE/HALT" switch on the console switch register to "HALT", and then starting at section 2.1 (C).

5.2 Regenerating "SIGI Pack A" from the original

"SIGI Pack A" contains all the SIGI text frames except those carrying school-specific information. Should the working copy of this disk become unusable, it may be recreated by making a new copy from the distribution pack labeled "SIGI UPDATE DISK 0A". Never use the update disk for any purpose other than making a new copy.

A) If RSTS/E is halted, follow the instructions in section 2.1 to start the system. If RSTS/E is running, follow the instructions in section 2.2 to halt it, and then press the "CONT" switch on the computer console switch register to bring the system to the "OPTION:" query.

B)B) Mount "SIGI Pack A" into drive 1, and "SIGI UPDATE DISK 0A" into drive 2. Set the "LOAD/RUN" switches on both drives to "RUN", and set "WT PROT" on drive 2 by pressing the "WT PROT" switch on that drive. Wait for the "RDY" indicator to light on both drives.

```
**************************************************
**                                              **
**  BE SURE THAT DRIVE 2 CONTAINS THE UPDATE PACK  **
**  AND THAT DRIVE 2 IS WRITE-PROTECTED TO PROTECT  **
**  THE UPDATE COPY FROM ACCIDENTAL ERASURE.       **
**                                              **
**************************************************
```

C) Load the "ROLLIN" program with the following dialogue on the console typewriter:

```
OPTION: LOAD <CR>
-------
LOAD PROGRAM: ROLLIN <CR>
---- --------
ROLLIN VXX
------ ---
# DK1:/FC<DK2:/WL/VE
-
```

D) The "ROLLIN" routine will be completed when the console writer returns another "#" sign, indicating that it is ready for a new command. At this point set the drive 2 "LOAD/RUN" switch to "LOAD", and when the "LOAD" indicator comes on in a minute or so, remove the "SIGI Disk CA - ORIGINAL" from drive 2 and return it to storage. "SIGI Pack A" in drive 1 now contains a copy of the original pack, and SIGI operation can be resumed by setting the "ENABLE/HALT" switch on the console switch register to "HALT", and then starting at section 2.1 (C).

5.3 Storing the SIGI research data files

For SIGI field-trial installations ONLY, SIGI maintains, in addition to the student record files, two additional forms of data for the use of the SIGI development staff at ETS. A matrix file named "SUMARY.DAT" accumulates summary data across all students, including such measures as the number of minutes spent in each portion of SIGI, the number of times the VALUES game is played, and the like.

In addition, for a randomly-selected 5% sample of students SIGI keeps a more complete record for detailed analysis. These are stored on the system disk in files identified by the student number (we do not record the student's name in these files - only their number - so they are confidential), and with the extension ".SDT". Periodically these files and the "SUMARY" file need to be moved from the system disk to the data collection disk supplied by ETS.

As a suggestion, this process of "bailing out" the system disk ought to followed at least once every week or two, so as not to tie up too much of the system disk storage.

```
****************************************
**                                    **
**  THIS SECTION APPLIES ONLY TO SIGI **
**  FIELD TRIAL INSTALLATIONS.        **
**                                    **
****************************************
```

A) Ensure that RSTS/E is up and running. If it is not, follow the procedure in section 2.1 to start it.

B) If "SIGI Pack A" is mounted in drive 1, set the drive 1 "LOAD/RUN" switch to "LOAD", and when the "LOAD" indicator comes on open the drive door and remove the disk cartridge.

C) Mount the ETS disk cartridge labeled "SIGI Data Disc" in drive 1. Set the "LOAD/RUN" switch to "RUN" and be sure that "WT PROT" is off on drive 1. Wait until the "RDY" indicator lights.

D) If you are already logged into account [40,1] - as you would be if you had just run SIGI - then go to (E) below. Otherwise log into account [40,1] with the following commands:

```
<CTRL>C
READY
-----

HELLO 40/1
PASSWORD: SIGI <CR>
---------

READY
-----
```

E) The process of moving the data files from the system disk to the ETS data disk is under automatic control of a program called "$SDATA". Run this program by typing the following command:

```
<CTRL>C

READY
-----
RUN $SDATA <CR>

SDATA - SIGI DATA BACKUP SYSTEM
----- - ---- ---- ------ ------
VERSION 1.0
------- ---
```

F) This program will now run for some minutes, the time depending on how many files need to be moved from the system disk. When the operation is completed, it will type:

```
SIGI DATA STORAGE COMPLETE
---- ---- ------- --------

READY
-----
```

Now set the drive 1 "LOAD/RUN" switch to "LOAD", and remove the ETS disk when the "LOAD" indicator comes on. This disk should be stored in a safe place when not actually involved in the backup procedure.

Chapter 7

Trouble-shooting

This chapter outlines some likely sources of problems in starting up RSTS/E, in using the terminals, and in using SIGI. In case of trouble, review the instructions in the pertinent section of the manual to be sure that a step has not been overlooked, and then review the notes in this chapter.

7.1 RSTS/E Start-up problems

A) In the bootstrap operations required in section 2.1 (C), be sure that the address set into the switch register actually transfers to the "ADDRESS" bus (the top row of indicators on the computer console) when the "LOAD ADDRESS" switch is pressed. If the address does not transfer correctly, set the "ENABLE/HALT" switch to "HALT" and then press "START" to initialize the processor. Then retry step 2.1 (C).

B) If the panel switches on the processor do not seem to be functioning, be sure that the "POWER" switch key is not rotated past the "POWER" position and into the "LOCK" position, which would inactivate the panel control switches.

C) If the bootstrap process in section 2.1 (C) does not cause the "OPTION:" query to be typed out on the console terminal, check to be sure that disk drive 0 has the RSTS/E system disk in it; that drive 0 is set to "RUN"; that the drive 0 "RDY" indicator is on; and that the drive 0 "WT PROT" indicator is off.

D) If the problem in paragraph (C) above persists, check that the console typewriter "MODE" switch is set to "LINE", and that the "BAUD" switch is set to "300". Also be sure that there is paper feeding up to the roller from the paper box below.

E) If it appears that commands from the console typewriter are not recognized, or if strange charaters are echoed, be sure that the keyboard "SHIFT LOCK" is not set. "SHIFT LOCK" is set when the small red indicator on the "SHIFT LOCK" key at the lower left corner of the keyboard is on. To clear "SHIFT LOCK", press the "SHIFT" key.

7.2 SIGI Terminal problems

A) If the Delta Data terminal does not come on when the "ON/OFF" switch is set to "ON", check that the power cord is seated firmly in the wall power socket. Also check that the other end of the power cord is firmly plugged into the back of the Delta Data terminal, as it is detachable at that end as well.

B) Be sure that the Delta Data control switches on the rear of the terminal are set as described in section 3.1 (C).

C) Be sure that the data connector to the modem or null modem box is firmly in place. Also be sure that the connectors between the Delta Data terminal and the Texas Instrument printer are all firmly in place, and that the Texas Instrument printer is plugged in.

D) Be sure that the "LOCAL/ON-LINE" switch at the front of the Delta Data terminal is set to "ON-LINE".

E) If strange characters are echoed on the Delta Data terminal, be sure that the "SHIFT LOCK" is not set. "SHIFT LOCK" is set if the small red indicator on the "LOCK" key at the left of the keyboard is on. It may be reset by pressing the "SHIFT" key.

Having "SHIFT LOCK" set will also prevent SIGI from recognizing the numeric keys (it will receive the upper-case equivalents instead), so check this if a SIGI user can't seem to make any acceptable response.

F) To communicate with RSTS/E, the Delta Data terminal must be in "TTY" mode. It is in "TTY" mode if the "TTY" indicator is lighted on the small indicator panel to the right of the screen. On occasion - especially after some forms of errors and abnormal program ends - the terminal will not be left in "TTY" mode. It will then be necessary to put it in "TTY" mode by holding down the "CTRL" key (left side of the keyboard" while pressing the "MODE" key (second row of dark control keys).

7.3 SIGI problems

A) For RK05-based systems ONLY, a program named $CHECK exists to make a general check of the SIGI system in case of troubles. It ensures that the user is logged into the correct account

(account [40,1]), that the required SIGI control files exist where they are supposed to, and that the required disks are in place. The state of "SIGI Pack B", on drive 2, is checked automatically. Because "SIGI Pack A" is not a file-structured disk it cannot be checked automatically, and so the "CHECK" program prints out a check list for the operator to follow.

To run "$CHECK" type in the following commands:

```
<CTRL>C

READY
-----
RUN $CHECK <CR>

CHECK - SIGI SYSTEM CHECK ROUTINE
----- - ---- ------ ----- -------
VERSION 1.1
------- ---
```

The "CHECK" program will now print out one or more messages, pointing out any problems with the SIGI files or the state of the SIGI disks. The checkout process is complete when the program prints:

```
END OF SIGI CHECK
--- -- ---- -----

READY
-----
```

B) If SIGI does not seem to be responding to keyboard inputs correctly, check "SHIFT LOCK" as described in section 6.2 (E) above.

APPENDIX F

SIGI HARDWARE GUIDE

SIGI
SYSTEM OF INTERACTIVE
GUIDANCE AND INFORMATION
EDUCATIONAL TESTING SERVICE
PRINCETON, N.J. 08540
609-921-9000

SIGI Hardware Guide

January, 1977

Questions about hardware for SIGI should be directed to Charles Ehrlich, SIGI Computer Director, Educational Testing Service, Princeton, New Jersey 08540, or to your local Digital Equipment Corporation sales office.

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SIGI is available on the Digital Equipment Corporation PDP-11 series of computers under the RSTS operating system. If you are interested in converting SIGI for a different computer or operating system, please contact Educational Testing Service.

RSTS is a general purpose timesharing operating system which can support a large number of simultaneous activities in addition to SIGI. The available programming languages include extended BASIC (BASIC-Plus), Fortran IV, COBOL, and RPG II. Software is available through Digital for administrative data processing and computer-assisted instruction. There is an extensive library of programs available for use by students in Social Science, Physical Science, Business, Mathematics, Statistics, Engineering and Computer Science courses.

Section 1 describes a SIGI terminal and how a student interacts with the system.

Section 2 will help you to determine how many SIGI terminals would be required to fully serve your student population.

Section 3 outlines the hardware required for typical four or sixteen terminal RSTS systems that could be dedicated to providing SIGI.

Sections 4, 5, and 6 describe the resources that would be required to add SIGI to an existing RSTS system.

Section 4 outlines the amount of disk storage required for SIGI.

Section 5 describes the computational load that would be imposed on a system and how this is likely to affect system performance.

Section 6 discusses the interfacing and communications options that are available for SIGI terminals.

Computer equipment models and prices change constantly. The figures given here are only intended as a guide. Please consult your local Digital Equipment Corporation sales office for up to date information on models and prices.

1. SIGI Terminals

A student using SIGI interacts with a CRT terminal. The computer presents and manipulates text materials on the display. Student responses are indicated by use of the ten number keys (0-9) and the Space bar, which is labelled "NEXT".

Each CRT terminal is equipped with a printer. At certain points in the interaction the computer will automatically print the contents of the display. At other times the student can request a printed copy of displays for future reference. A voluntary print request is signalled by the period key in the numeric keypad, which is re-labelled "PRINT".

Since there is a printer with each CRT terminal, the printed copy is immediately available and students frequently refer to the printout while using SIGI. The printout that the student receives is the only record of the details of the SIGI session and it is up to the student to decide whether or not the counselor should see it.

The SIGI software will function with terminals that are not equipped with printers but the system is not nearly as effective for the student without a printed record to refer to. Too much time and information is lost if the student has to stop and make notes of what has been presented.

When a print is requested, the information is printed from the memory of the CRT terminal. We do not have the capability (in either hardware or software) at this time to share one printer for several terminals.

Terminals that are set up for SIGI can be used for other activities when they aren't being used for SIGI.

In order to present a large amount of information and still have the student interaction proceed smoothly the SIGI terminals should be operated at 120 characters per second (1200 baud) or faster. Details of the hardware required for this are discussed in section 6.

The SIGI software as supplied supports the VT52 terminal manufactured by Digital Equipment Corporation. If you have comparable terminals, and you want to modify the SIGI software to support them, contact Educational Testing Service for detailed requirements and modification information.

The VT52 is an upper and lower case ASCII CRT terminal which displays 24 lines of 80 characters. Each character is represented by a 7 x 7 dot matrix with a P4 phosphor for a legible white on black display. Two models are available: The VT52-AE connects to the computer or modem with an EIA interface, and the VT52-AA connects to the computer with a 20 ma current loop interface (see section 6 for interface details).

The VTXX-KA printer interface connects the VT52 to either a serial EIA printer such as the LA35 or a parallel high speed printer such as the LA180. This interface does not provide a delay following Carriage Return which is required for the correct operation of many serial printers, such as the Texas Instruments 733.

The LA35 is a 30 character per second impact printer which uses ordinary pin-feed paper and prints upper and lower case using a 7 x 7 dot matrix. It should be equipped with an EIA interface (LAXX-KG) for connection to the VTXX-KA printer interface.

A complete SIGI student station would include: VT52 CRT terminal, VTXX-KA printer interface, LA35-CE printer and LAXX-KG EIA interface. The purchase price from Digital would be $4,765 and a maintenance contract would cost $44 per month (January '77 figures).

If the 180 character per second LA180 printer were substituted for the LA35, then each student station would cost $5525 and a maintenance contract would be $75 per month.

2. How Many Terminals

Most students use SIGI during their first year of classes and then come back and use it again if they feel a need to re-examine their career plans. The average student spends a total of 3.5 to 4 hours working with SIGI during his college career.

To calculate the number of terminals necessary to serve your student population, first decide how many students should use SIGI each year. Typically this is the number of entering students. Multiply the number of students by four to get the number of terminal hours required.

Next determine the number of hours per year each terminal will be available to students. Take the number of days per year that SIGI will be available (include weekends if appropriate) and multiply by the number of hours per day students would have access to the terminals. This gives you the number of hours per year each terminal is available.

Divide the number of terminal hours required by the number of hours per year each terminal is available to get the number of terminals required.

For example, if a college operates 225 days a year and can make SIGI available to students 12 hours per day, then each terminal is available 2700 hours per year and can serve 675 students. A college with 2700 students entering each year would need four SIGI terminals to accommodate all of them.

The colleges that are presently using SIGI schedule students for appointments of an hour or an hour and a half in length (the length of a class period).

3. RSTS Systems for SIGI

RSTS systems can be configured to support as many as 63 terminals and a variety of other applications in addition to SIGI. Two example systems are outlined here. Your Digital Equipment Corporation sales office can help configure the correct system for your needs.

The system outlined in section 3.1 is a starter system that would initially include four SIGI terminals. Section 3.2 shows how this basic system would be expanded to 16 terminals. The system, as outlined, includes only the hardware required by SIGI; more or different hardware would be required for other applications. Consult your Digital Equipment Corporation sales office for details.

The prices given here do not include the ETS SIGI lease fee. Maintenance prices are per month on a standard eight hour day, five days per week contract. Prices shown are intended as a guide only, and are from January 1977.

3.1 Four Terminal System

The basic four terminal RSTS system for SIGI would be a PDP-11/34 processor with 64 k words (128 k bytes) of parity MOS memory. The computer would be equipped with a line frequency clock, memory management, a Read Only Memory bootstrap loader and a programmer's console. The console terminal, which is used to control system operation, would be an LA36 DECwriter II. Two cartridge disk drives, one fixed, and one removable, provide 7.5 million bytes of on-line storage for programs and data. A multiplexer which provides interfaces for up to eight terminals is included (although only four terminals are provided).

The basic RSTS system would cost a non-profit institution $40,160 and a maintenance contract would be $310 per month. The costs and items involved are broken down as follows:

	Cost	Maintenance
1 - 11T34-MA Computer System	$33,280	$235
Non-profit discount	-$8,780	
1 - KY11-LB Programmer's Console	$ 660	--
2 - MS11-JP 16 k Word MOS Memory	$ 5,100	$ 50
1 - M7850 Parity Control	$ 880	--
1 - DD11-D Backpanel Unit	$ 660	--
1 - DZ11-A Asynchronous Multiplexer	$ 2,310	$ 25
1 - QR430-AE RSTS/E Software License	$ 6,050	
Processor Total	$40,160	$310

Terminals for four SIGI stations would require the following equipment. The cables listed are for terminals located within 50 feet of the computer. See section 6 for other communications options.

	Cost	Maintenance
4 - VT52-AE CRT Terminals	$ 8,800	$ 80
4 - VTXX-KA Printer Interfaces	$ 960	$ 20
4 - LA35-CE DECwriter II printer	$ 9,040	$ 76
4 - LAXX-KG EIA Interface for LA35	$ 260	--
4 - BC03M-25 Null modem cable, 25 ft	$ 240	--
Terminals Total	$19,300	$176
System Total	$59,460	$486

After the first year the RSTS operating system license and maintenance service plan costs $1,155 per year.

If the cost of the hardware, software, and maintenance from Digital is totalled over a five year period in which the four SIGI terminals are operated twelve hours a day, 225 days per year, the cost per terminal hour would be $1.73. Over the five years 13,500 students would be able to use SIGI; the equipment costs would be $6.92 per student.

3.2 Sixteen Terminal System

The basic RSTS system outline above can be expanded to 16 terminals and a total of 112 k words (224 k bytes) of memory by the addition of the equipment listed below. There are possible savings on purchase price and installation charges (not shown) if the extra equipment is included initially.

	Cost	Maintenance
3 - MS11-JP 16 k MOS Memory	$ 7,650	$ 75
1 - DZ11-B Expansion Multiplexer	$ 1,710	$ 21
	-------	----
Expansion Total	$ 9,360	$ 96
12 - VT52-AE CRT Terminals	$26,400	$240
12 - VTXX-KA Printer Interfaces	$ 2,880	$ 60
12 - LA35-CE DECwriter II printers	$27,120	$228
12 - LAXX-KG EIA Interfaces for LA35	$ 780	--
12 - BC03M-25 Null Modem Cables 25 ft	$ 720	--
	-------	----
Additional terminals	$57,900	$528
Four terminal system total	$59,460	$436
	-------	----
Sixteen terminal total	$126,720	$1060

A sixteen terminal system operated 12 hours per day, 225 days per year, could provide SIGI for 10,800 students each year. Over five years the cost per student would be $3.60 or $0.90 per terminal hour.

4. Disk Requirements

SIGI requires about 9000 blocks (512 bytes per block) of disk storage for programs and data. The majority of the disk space is used by two large data files which contain the information used to create displays. The remainder of the program and data files are relatively small. SIGI files can be located on any combination of RSTS disks.

All disk space, including student records, is allocated when SIGI is set up and remains fixed. Additional files are created during system operation only if detailed record keeping is enabled for research purposes.

Operating SIGI on a RSTS system where the main storage media are RK05 cartridge disks requires two logical disks dedicated to SIGI and a small amount of space on the system disk. If additional storage is required for SIGI, either RK05F or RK05J disk drives can be added. RSTS can support up to eight logical disks. The RK05F is a new fixed media disk drive which provides two logical RK05J's. Contact Digital for details.

Most systems which are equipped with the larger RK06 or RP series of disks have enough disk space available for SIGI.

The SIGI software is available on RK05 disk cartridge and 9 channel 800 bpi magnetic tape. Users who do not have access to either of these distribution media will have to arrange their own conversions.

5. Core and Swapping Requirements

When a student is using SIGI there is one 14 k words BASIC-Plus program running. One copy of this program runs for each terminal that is using SIGI. The program does not CHAIN to other modules.

From the system viewpoint the major activity of SIGI is displaying information from the disk on the terminal for the student to read. There is very little computation involved and the rate material is presented depends on the student.

It is very difficult to predict in advance what hardware (if any) should be added to an existing RSTS system to accommodate SIGI. Everything depends on how heavily loaded the system is and the characteristics of the load.

For an average RSTS system, without a swapping disk, there should be enough user core (the part of memory available for user jobs) to hold 1/3 of all the jobs active in the system. Systems with swapping disks or the faster RK06 or RP04 disks can accommodate more jobs.

In some systems the addition of the disk directory cache software option can improve throughput considerably. Systems that are compute bound can benefit from the addition of floating point hardware, faster memory (especially for the BASIC-Plus run time system), or a faster processor. Swap bound systems can benefit from more memory, a separate swapping disk or a faster system disk such as the RK06.

Your Digital Equipment Corporation sales representative can help you determine which of the available expansion options would be most cost effective for your system.

6. Interfaces and Communications

Each SIGI terminal requires an interface to connect it to the computer. The VT52 terminals used with SIGI are full duplex terminals operating at 120 characters per second (1200 baud) or faster using a 10 bit ASCII code (one start bit, seven data bits, one parity bit (ignored) and one stop bit).

There are three types of interfaces available for connecting terminals to PDP-11 RSTS systems. There are the DL11 family of single line interfaces and the DH11 and DZ11 multiplexers.

Each of these interfaces is available in versions using the EIA RS-232-C voltage level signalling convention and the 20 ma current loop (or Teletype) signalling convention. EIA voltage level interfaces are preferable if new equipment is required.

Current loop (20 ma) interfaces can be used for terminals located up to 1000 feet from the computer. Order the VT52-AA CRT terminal instead of the VT52-AE. Current loop interfaces can not be connected to modems without an EIA adapter such as the Digital H313-A.

Terminals located within 1000 feet of the computer can be connected to EIA interfaces by Null Modem Extension cables (Digital BC03M).

Modems are required for distances greater than 1000 feet (or locations where cables cannot be installed). One modem is required for each end of a link. Either regular dial-up telephone lines or a dedicated leased telephone line can be used. If the telephone compmany in your area has a message unit tariff that charges for connect time, a leased line will usually be cheaper.

If dial-up telephone lines are used the only modem presently on the market for 1200 baud full duplex operation is the Vadic 3400. For an educational institution a single modem (with chassis and power supply) would cost $830 (June '76 prices). Vadic modems can be purchased from Vadic or leased through General Electric's Instrumentation and Communications Equipment Service. Contact Vadic Corporation, Mountain View, California (415-965-1620) or their local representative for further information.

The RSTS operating system will not support the Request To Send line discipline required by half duplex modems.

On a leased four wire telephone line terminals can be connected using Vadic 3400 modems or Bell 202 modems (or their equivalent). When ordering modems from the telephone company be sure they are set up for full duplex operation. Have your Digital field service engineer and the telephone company data group representative agree on which EIA modem control signals will be required and supplied by each interface.

The Digital DH11-AD and DZ11 multiplexers are supplied without cables. An EIA male to female cable equivalent to Digital's BC05D will be required for each line connected to a modem. The BC03M null modem cable (female to female) is all that is required for connection to local terminals.

APPENDIX G

COUNSELOR'S HANDBOOK FOR SIGI

COUNSELOR'S HANDBOOK FOR SIGI

by

Warren Chapman

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INTRODUCTION

The Counselor's Handbook for SIGI has been written for counselors in community colleges and other institutions that use the System of Interactive Guidance and Information (SIGI) in their career guidance programs. Its purpose is to familiarize counselors with the theory that underlies SIGI, to describe the components of the system, and to anticipate problems that students may encounter in using it.

The handbook consists of ten chapters and two brief appendixes. The first chapter explains the theoretical and developmental background of SIGI. (Portions of the chapter were written by Dr. Martin Katz, who conceived the theory of guidance embodied in SIGI and was the prime mover behind SIGI's actualization.) The second chapter concerns the physical operation of the system. Then chapters III through IX describe the interaction itself, the printouts the students may get, the problems they may get into, and the ways in which counselors can help them. Finally, chapter X presents a general model for decision-making based on the principles found in SIGI.

Although many years of research and experience have gone into the basic theory, our knowledge of what students do at the terminal, how SIGI may affect them, and how counselors can best take advantage of it is very limited. The little we know is based on a pilot study with about thirty students who interacted with an earlier version of SIGI over a period of two months. After that study was completed, the entire script was rewritten. Furthermore, the constraints of time and the experimental situation did not permit us to work with counselors at our pilot study college. Therefore, as the reader may imagine, there is much that we do not know concerning the way students react to SIGI, how it may fit into the counseling program, how counselors can best help their students with SIGI, when counselors should intervene and when they should keep out, and much more. Our ignorance may exceed our knowledge.

Consequently, much of the content of chapters III through IX must be regarded as speculative. The material under the headings "Things for the Counselor To Look For," "Use of the Printouts in Counseling Students," and "Helping Students Use the System" contains our best conjectures as to what may happen. We have tried to include everything worth conjecturing, but inevitably situations will arise we did not foresee, and other situations that we have analyzed in considerable detail may never occur.

The handbook is purposely redundant so that each chapter may be reasonably self-sufficient. We hope that the repetition of material will make the handbook easier to use when you cope with specific problems. The table of contents lists every topic identified by a separate heading within a chapter. Therefore when a student runs into some difficulty in, say, the Locate system, you can turn to the table of contents and find all the topics discussed in the chapter that is devoted to that system.

The next edition of the handbook will be, figuratively speaking, written by you counselors. Please keep the responsibilities of authorship in mind as you interact with SIGI and its student clients. How should the handbook be changed? What parts discuss problems that never arise, what parts fail in their explanations, what should be discussed that is not discussed? We will need your input for a new handbook, and we plead with you to keep memoranda of your experiences and observations.

I would like to thank Dr. Martin Katz for allowing me to use the materials attributed to him in chapter I, as well as for his invaluable suggestions for improvement of each chapter. I also want to thank Ms. Madeline Bara for typing and retyping the manuscript and keeping all the messy changes in order.

Warren Chapman
June, 1975

NOTE: The information that appears in figure 4A (page II-16) is for counselors' eyes only.

Figure 4A should be removed from the handbook and kept in a safe place.

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CHAPTER I - BACKGROUND OF SIGI

The System of Interactive Guidance and Information (SIGI) is a computer-based guidance system designed to help community college students make informed and rational career decisions. It is based on the theory of guidance developed over many years by Dr. Martin R. Katz, Senior Research Psychologist at Educational Testing Service. The adaptation of the theory for computer presentation was executed at Educational Testing Service under grants from the Carnegie Corporation. The National Science Foundation supported elements of a pilot study conducted in 1973 and is supporting the large-scale field testing of SIGI begun in 1974-75 at four community and one four-year college.

In this guidance system the student interacts with a computer in such a way as to examine and explore his own values, obtain and use relevant information, interpret predictive data, and formulate plans. The interaction helps the student to arrive at tentative career decisions and to modify them as he gains new insights and additional information. The decisions involve both educational and occupational options. The emphasis, however, is not merely on the content of decisions, but on the process of decision-making. As the student progresses through SIGI, he learns to move freely within the structure of the system. In gaining control of the system, he develops competencies and masters strategies for rational behavior in the face of uncertainty--which may be the closest we can get to wisdom.

THEORY OF GUIDANCE

The theory of guidance that underlies SIGI is described briefly in Chapter X of this handbook. Here it is sufficient to say that the theory rests on the primacy of values in the decision-making process. A decision-maker is perceived as bringing to a decision an array of values--hopes, aspirations, expectations. Each decision presents two or more options that differ in the degree to which they provide opportunity for satisfying those values. The decision is seen as the process of identifying the best option--the one that, given the decision-maker's abilities and resources, offers him the best chance of realizing his values.

Rationale for SIGI[1]

What is the rationale for stressing the process of decision-making over the content of the decision?

Humanistic ethic. It should be emphasized, first, that the ethic of the system is humanistic rather than mechanistic. There has long prevailed a stereotype associating computers with dehumanized control. Indeed, as far back as 1928, Clark Hull (in his book Aptitude Testing), gazing prophetically into a brave new world of psychometrics and computers, proposed that a single universal battery of 30 or 40 aptitude tests be given to 8th-graders. Scores would be fed into a machine that would already contain forecasting formulas for the major occupations. The student would then choose one of the three or four occupations "in which his chance of success is greatest."

Developments in measurement, data processing, and statistical techniques over the intervening decades created a rush of excitement about the possibilities for translating Hull's dream into a reality. But the vast technological gains appeared to invoke a law of diminishing returns. Neither Hull nor his successors anticipated the stubbornness with which the data (reflecting the multipotentiality of individuals) would resist neatly differentiated forecasting formulas.

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[1] "Rationale for SIGI," "Selection of the Ten Value Dimensions," and "Occupational Information" sections of this chapter were written by Martin R. Katz. They are taken from Chapman, Norris, & Katz, 1973, with slight editing.

Faith in the prospects of the trait-and-factor model have persisted. The main objections to this model, however, lie not in its inaccuracies but in its premises. It assumes that prediction of occupational membership and success is the main--virtually the sole-- business of guidance. It starts with the explicit hypothesis that occupational sorting does tend to take place in a certain way--through trait-matching. It proceeds on the less clearly explicit conviction that occupational sorting should take place in this way--only more so. Trait-and-factor theory seems to hold that the individual is in effect "keyed" to one or a few "correct" occupations, that the key should be recognized early in adolescence, and that all subsidiary decisions--as to education--should be fitted to it. Application of this theory would presumably result in a more exact homogeneity of membership in each occupation, and purport to reduce waste, vacillation, or error along the way. It would also tend to reduce the student's role in decision-making to one of passivity.

The evidence that individuals are multipotential and occupational requirements are flexible is damaging for the manpower model. But it supports a guidance model which maximizes individual freedom of choice. A guidance model hinges on satisfaction of individual values, with manpower needs helping to determine the opportunities and means for gaining such satisfactions. There is better evidence for the assumptions underlying the guidance model than the manpower model. For example, the validities of differential predictions of interests tend to be much greater than the validities of differential predictions of achievement (Norris and Katz, 1970).

This finding does not mean that predictions of success are useless in occupational choice. Clearly, there is ample justification for using actuarial data to estimate an individual's resemblance to an occupational population and the probabilities of his entering an occupation, persisting in it, and (although standards are difficult to define and data hard to come by) achieving some measure of success in it. There is much less justification for using actuarial data to determine choices. Yet the implications and practice of trait-and-factor theory have often exceeded the descriptive and tended toward the imperative. This creeping control might tend to improve some kinds of predictions by making them virtually "self-fulfilling prophecies."

If computers are used only to power a directive trait-matching approach, as appears to be proposed in Department of Labor pilot projects (U. S. Department of Labor, 1971), the stereotype of computers as encroaching on and restrictive of free decision-making by individuals will be perpetuated. One purpose of the job-matching model is to help individuals make appropriate choices. But the method excludes the individual from the decision-making process; it rests all control in external agencies, leaving the individual only the choice of acting or not acting on the output.

SIGI, on the other hand, assumes that guidance should shun even such benevolent control. It assumes that we don't know what will be best for the individual (or society) except freedom to work things out. Thus, we define the best choice as the choice that is most nearly free. But we do not define freedom as laissez faire. Rather, it is the freedom (expressed by Shaw in the preface to Man and Superman and quoted by Freud in contrasting his "reality principle" with his "pleasure principle") "to be able to choose the line of greatest advantage instead of yielding in the path of least resistance." Advantage in this sense involves some assessment of utility as well as probability. Freedom involves active participation and control. It also incorporates the notion of career decision-making as a continuous process rather than a "one-shot" episode. This sense of continuity encourages people to formulate their plans as theories to be tested, and to revise or confirm their decisions in the light of the feedback they get from outcomes. This approach allows them to learn from experience.

Process of choosing. So without directing the content of an individual's choice, it seems possible to help him in the process of choosing. This emphasis on process does not pretend to insure the "right" choice--except insofar as the right choice is defined as an informed and rational choice. Our bias--our conviction--is that in education enlightened processes are intrinsically important. Therefore, we bend our efforts to increase the student's understanding of the factors involved in choice (imperfect though our own understanding may be) so that he can take responsibility for his own decision-making, examine himself and explore his options in a systematic and comprehensive way, take purposeful action in testing hypotheses about himself in various situations, and exercise flexibility in devising alternate plans.

The student's interaction with the computer embodies this model of guidance. As the student learns to control the computer and move freely through the system, he is also developing competencies for independent decision-making. The computer does not just give him an "answer" to a question; it also suggests questions for which he can provide answers. Thus in his dialogue with the computer, the student both receives and generates information, and learns how to connect the two kinds of information. Throughout, his role is active. He can change his inputs as he recycles through parts or all of the system to see what effect new premises may have on the outputs.

In short, we don't want to play the decision-making game for the student. We want to help him master the strategies for rational behavior in the face of uncertainty so that he can play the game effectively himself.

Emphasis on values. Any rational process requires a principle of operation. A humanistic process looks for a humanistic principle, one that takes into account the multipotentiality of human aspirations and needs. In SIGI, this principle is the individual's values. They are the constructs he uses to define what he wants, the satisfactions and rewards he seeks. The first thing the student does is to examine the structure of his values, then translate them into vectors and valances. Eventually he will be in a position to ask how well each of the options available to him measures up to his values. Thus, values become fields of force and direction in career decision-making, influencing all the interaction between definition and decision.[2]

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[2] More detailed and comprehensive discussion of the principles of guidance that underlie the rationale for SIGI appear in various monographs and articles. See Katz, 1954, 1963, 1966, 1969a, 1969b, 1969c, 1969d, 1973.

SOURCES OF DATA

Selection of the Ten Value Dimensions

The ten values selected for use in SIGI are High Income, Prestige, Independence, Helping Others, Security, Variety, Leadership/Responsibility, Work in a Primary Field of Interest, Leisure, and Early Entry. [The values are defined in figure 6, Chapter IV.] Where did these ten value dimensions come from, and why did we settle on them?

We did a number of studies of our own, and of course took account of the research of others. For example, we asked students, in structured interviews, a series of questions designed to elicit the dimensions along which they construed occupations. We asked them to tell us what they knew about an occupation of interest to them, and to indicate what other information they would like to have; what appealed to them most about it, and what least; what events or additional information might make them change their preference for that occupation; what characteristics an "ideal" or "dream" occupation would have, and also a "nightmare" occupation--the worst they could imagine. In a simulated occupational choice procedure, we gave students an opportunity to ask us questions about a set of unknown occupations; from the information we gave them, they would choose one as most attractive. Classifications of their questions and their evaluations of the occupations in light of the information they received gave us an additional check on the comprehensiveness and relevance of our values dimensions. In a variation on Kelly's REP test (Kelly, 1955), we gave them triads of occupations, asking them to indicate which two of the three seemed to offer satisfactions and rewards that were more nearly alike than the satisfactions and rewards offered by the third one. From their responses we were able to determine the dimensions along which they construed similarities and differences in occupational satisfactions.

In addition, as part of a questionnaire follow-up of a large national sample of secondary school students one year after completion of high school (Norris & Katz, 1970), we asked them to weight the importance of some dozen values dimensions; we computed the intercorrelations among the weights, and did an unrestricted maximum likelihood factor analysis of the intercorrelation matrix, (We also put into the matrix aptitude and interest scores, and found that the three domains--aptitudes, interests, and values--were independent.)

Despite all this research, we are sure there will not be universal agreement with some of our omissions. For example, we decided that we could not formulate a good enough operational definition of Creativity for this purpose. And a value called Sense of Accomplishment, or Pride in Work, did not seem useful in differentiating between occupations of concern to community college students (although it might differentiate between specific jobs or positions within an occupation and clearly differentiated between many unskilled and higher-level occupations). Incidentally, in the pilot study we found that students do perceive the dimensions as independent (intercorrelations of the weights tend to be quite low), each of the values is regarded as important by many students (as indicated by the mean weights), the weight given each value varies greatly across students (as indicated by the standard deviations of the weights), and students did not feel that values of importance to them had been omitted (as determined by interviews after their use of SIGI) (Chapman, Norris, & Katz, 1973).

The inclusion of Interest Field as one of the values dimensions may be a bit confusing. This value is defined in terms of the importance to the individual of working in a field in which the activities represent a primary intrinsic interest rather than in some other field. The student indicates his preferred interest field from six options, each defined and illustrated: scientific, technological, administrative, personal contact, verbal, and aesthetic. [The fields are defined in figure 7, Chapter IV.] The designation of these six areas obviously takes cognizance of research on interest measurement and dimensions of occupational interests.

Occupational Information

Occupational information is stored in the form of responses to the 28 questions available to the student in the Compare subsystem. The list of question appears in figure 14, Chapter VI.

Where did all this information come from, and how accurate is it? It came from more sources than we have space to list, and it is as accurate as we can make it with the help of specialists in many fields--including national sources such as the Bureau of Labor Statistics and various other bureaus of the Federal Government, professional organizations, labor unions, occupational briefs and monographs; a similar variety of regional and local sources, including many State agencies; plus a miscellany of sociological and psychological studies of occupations, college handbooks, assorted publications, and a wealth of cooperative and informed people in the various occupations.

Data from different sources sometimes failed to agree. We searched into such discrepancies very carefully. For example, when data were derived from different surveys, we evaluated sampling procedures and response rates, and made some judgment about the trustworthiness of each source. Although SIGI emphasizes national rather than local occupational information, we checked national data against representative regional and local data, and often incorporated regional differences when they were significant.

Documentation for all the information is on file in our office library, and is continually brought up to date, with changes edited into the computer periodically.

All but four of the questions can be answered by "hard" data found in solid studies from multiple sources. To single one out, by way of acknowledgment of the kind of cooperation we received: a prepublication copy of Paul Siegel's University of Chicago doctoral dissertation, Prestige in the American Occupational Structure (Siegel, 1971), gave us most of our prestige ratings. The four questions that required more active inference on our part are questions 14, 15, 21, and 22. For each of these "soft" areas, four levels of degree were operationally defined. Then, in addition to our readings, we directed questions based on these definitions to representative members of each occupation to elicit their experience and observations. For example, concerning Variety: How many different problems and activities do you (and others in your occupation) typically work on each week, month, or year? How many different people do you deal with? To how many places does your work take you? We did not have time or resources to poll a large sample from each occupation on these questions. (We hope to extend our activities in that direction later.) So the responses for each occupation are pooled with our readings as a basis for inference and consensus among our own staff.

Chapter IX (pages IX-10--IX-11) describes our method of rating the occupations on the opportunity they provide to satisfy each of the ten values.

Information for the Prediction System

Information for the Prediction system at each college came from the college itself. Chapter VII contains a description of the information and how it is used. The following remarks are a summary of that description.

The college identifies a "key course" for each of its curricula. A key course is one that occurs early in the curricular sequence of courses, is representative of the whole curriculum, and provides grades that differentiate between those who tend to succeed and those who tend to fail in that curriculum. For a Prediction system to be constructed, students in the course must reveal their test scores (if any) and certain historical data about themselves, and must rate themselves on four factors that instructors have selected as contributing to good grades.. The factors consist of such items as interest in the subject matter of the course, reading ability, manual dexterity, and so on. The students also see the distribution of grades for previous students, and they then estimate their own grade. At the end of the term, when the students have received their actual grade, regression equatinns are computed using as predictor variables the best combination of two or three of these items. These equations are then stored in the computer and are used to calculate "predictions" (in the form of probability statements) for students interested in the curriculum that the key course represents.

Test scores are included among the predictor variables if tests are required by the college, but our preliminary experience indicates that we can make satisfactory predictions (multiple R's greater than 0.40) without them.

Information for the Planning System

Information for the Planning system at your college comes partly from the same sources as our occupational information, but mostly from your college itself. Occupations are classified in accordance with the amount of education required for entry into them, and interaction varies with the classification. Also, students see an "occupational overview" showing them the steps they should take in order to qualify themselves for entry into an occupation. Data for the classification and the overview are collected with the rest of the occupational information.

All the rest of the information in the Planning system is prepared by your own college. It consists of the program or programs of study (course listings) recommended by your college for preparation for each occupation, the prerequisites for admission into that program, and, where appropriate, a list of nearby transfer institutions where your students can complete their preparation. If your college does not have a suitable program, students see a special display naming institutions that do offer such a program. Sources of financial aid available to your students are also displayed.

THE RELATIONSHIP OF SIGI TO COUNSELORS

SIGI is planned to fit into the regular guidance programs at community colleges. It will not replace counselors or be competitive with them. It is a tool, analogous to a pocket calculator, that is available to the counseling staff for use in career guidance.

Just as computers opened the way to activities formerly beyond human reach because of their mathematical complexity, so SIGI opens the way to new levels of career guidance. It can hold and manipulate a vast array of occupational information, arrange and rearrange it in an infinity of unique ways to suit the needs of individual students, provide instant information about entry requirements for each occupation, help students assess "the odds" of success, and provide a model for comparing the desirability of occupations with respect to the students' own unique value system. It can also "teach" a process for decision-making. All of these activities are now available to counselors for the benefit of their clients.

On the other hand, SIGI, like any tool, should not be used for tasks it was not designed for. SIGI cannot be expected to help students with emotional problems, a better sex life, animosity toward an instructor, threats of suicide, tangles with academic probation, or dyslexia. It cannot even say hello in a friendly voice to a student in the corridor.

It is clear from the foregoing discussion that SIGI complements the counseling function in only one area, career guidance and information. (It may perhaps be applicable to instruction in decision-making, too.) The exact role it will play in this area will depend on the counseling program at each college and on the enterprise and "style" of individual counselors. What, then, may counselors expect to be their role in the area of career guidance, and what can they assign to SIGI?

Lacking field experience, we can only speculate on the answer at this time. We can see, however, three degrees of relationship between SIGI and the counselor.

1. SIGI Self-Sufficient

SIGI is designed to operate without human supervision. Each display contains instructions for moving on, the response patterns are very simple, and the computer has been programmed to refuse "illegal" inputs. It is almost impossible for a student to become "hung up" as a result of his own mistakes. Once students have signed on, they are able to operate the terminal without having to ask for help.

Therefore, if SIGI happens to meet the needs of students with respect to career guidance, they can engage in the interaction without need of any counselor assistance at all. In fact, there is no need for counselors even to know whether a student has been on SIGI or not, unless SIGI is part of a course assignment or the student is a subject in a research project.

In this situation counselors can turn over to SIGI the whole burden of career guidance.

2. The Students' Needs Exceed the Scope of SIGI

Students may encounter problems in career guidance that are beyond the scope of SIGI. They may be faced with decisions about jobs (as opposed to occupations) or with job-hunting. Or they may be interested in an occupation that is not in the SIGI data bank. We believe that the SIGI occupations include those of interest to over 95% of all community college students, but inevitably some students will want an occupation that SIGI does not have.

In this situation the counselor must supplement SIGI as an information resource. Decisions about jobs require local information that is not available on SIGI, as well as some modification of the SIGI model. Students considering occupations not on SIGI will need help in identifying sources of information and in rating the occupations on their potential capacity to satisfy the students' values. We hope that this handbook will be helpful in suggesting suitable procedures. Chapter X tells how to adapt SIGI for decisions about jobs, and the general SIGI model is applicable to decisions about occupations not found in the computer memory.

3. Students Need Help in Interpreting SIGI

Almost certainly some students will not find SIGI self-sufficient. Even though they do not need help in making the system run, they may not understand the implications of some of the displays. They may not realize that a particular set of occupations has special significance for _them_ because of _their_ values. They may fail to grasp the reasoning behind the predictions or the subtleties of using numbers to assess the desirability of rival occupations. The emphasis of this handbook is on this third situation.

The role of the counselor in this situation is, obviously, to come to the rescue. But the truth is that at the moment we lack experience to know how much help students will need in interpreting SIGI. Hence the thickness of the handbook. We have tried to anticipate every possible problem of interpretation and suggest ways that counselors can offer assistance. Many situations described in the handbook may never arise; and so ingenious are people in finding ways to go wrong that some other situations will arise that we did not think of.

As you interact with students and gain experience in their understanding of SIGI, we ask you to share your insights with us. Our hope is that the second edition of this manual will be written by the counselors themselves.

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CHAPTER II - BECOMING FAMILIAR WITH SIGI

SIGI consists of six interrelated systems, VALUES, LOCATE, COMPARE, PREDICTION, PLANNING, and STRATEGY. Each involves a different activity and also concerns a different step in a decision-making process. Figure 1 is a schematic explanation of the systems, the activity the student undertakes in each one, and the step each system occupies in the decision-making model.*

These systems are described more fully in separate chapters. Here it is enough to note that each system has two functions. The first is to organize and dispense information. In this respect the systems are more or less independent of one another. The Values system helps students organize their values without regard to any specific occupations. The Locate system lists occupations on the basis of their potential to satisfy certain values, but it does not concern any other kind of occupational information. The Compare system is a kind of encyclopedia of information and is not confined to the values dimensions. And so on: each system occupies a separate realm.

The second function is to teach a step in a decision-making process. In this respect the systems are very much interdependent. The purpose of each is defined by the place it occupies in the process. Thus the Locate system depends for its effectiveness on the students' having previously determined which values are important to them. The Compare system becomes a mare's nest unless students know what occupations to ask about. Although a system can be detached and used as a separate resource when the purpose is to get information, it cannot be removed from context when the purpose is to learn the decision-making process.

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*Figures referred to within a chapter are collected at the end of the chapter.

This duality of function is obviously important in counseling. Some students may need factual information that one SIGI system or another can supply. Others may need the whole paradigm for decision-making or may lack insight at some step in the process. The success with which you use SIGI will depend to some extent on your ability to use it in different ways to meet different needs.

The best way to learn both the nature of the information dispensed by each system and also the function of that system in the decision-making process is first to go through SIGI in the role of a student. Then read in this handbook the chapters that discuss each system. Finally, return to SIGI and look at the systems from the point of view of a counselor. You can sign onto SIGI by using one of the nine DEMO numbers that have been set aside for counselors or visitors who want a demonstration of SIGI.

But first you will need to know more about how SIGI operates.

Novice and Initiate

Since the systems are dependent on one another in their function of teaching how to make decisions, the order in which students encounter them is obviously important. They have to go through the first step in the process before being exposed to the second, and so on.

On the other hand, when students have learned the process, the order in which they encounter the systems depends only on their needs of the moment.

This is so because the students are now presumably using SIGI as an information system, not as a teaching machine. Therefore they should be free to move from system to system in any order and to bypass the instructional sequences.

How are these apparently incompatible uses to be taken care of? SIGI solves the problem by forcing new students to go through the systems in the order listed in figure 1 until the students have been through each system at least once--that is, they have completed STRATEGY. Then they are freed to enter any system at will and to take short cuts within the systems.

In this handbook we use the word novice to designate a student who has not yet been through STRATEGY for the first time. A student who is no longer a novice is an initiate.

Figure 2 shows the distinction graphically. The novice (solid line) begins with INTRODUCTION and is forced to follow a prescribed path from one system to the next. He is free to roam within any system once he has entered it. But when he has finished, he must go to the next system in the sequence. If he signs off, the computer will start his next session at the point where he left off.

When he has completed STRATEGY for the first time, he follows the broken line designating the path of the initiate. He goes from any system to a "menu" and from the "menu" to any system. The "menu" is a display allowing him to select any system or to sign off. (The "menu" is reproduced as figure 13, page V-28.)

Student Records

Some of the information that students generate in one system is used in other systems. For example, the weights assigned to the ten occupational values in the Values system are displayed in LOCATE and used in STRATEGY to compute "desirability sums." Similarly, a list is made of the occupations that are of special interest to the student.

The information is stored on disc between sessions, indexed by the student's SIGI number. It is brought into memory when the student signs on and may be added to or changed by what happens in a session. For instance, if a student reweights his values, the old record will be written over by the new one.

The information that is necessary to carry the student through SIGI, which is stored in the student record, should not be confused with data about students' responses that are accumulated for research purposes. The information in the student record is minimal. It consists of the ten value weights, the chosen interest field, age, sex, enrollment status, some biographical data and test scores (if any), occupations retrieved in LOCATE or selected for examination by the student, certain switch settings that the computer refers to, and the student's status with respect to the systems he has completed. The computer also collects data across all students on every response they make. These data are not identified as to student. They are kept separate and will be analyzed for research on SIGI. They will not be discussed in this handbook.

Student Numbers and DEMO Numbers

Student numbers are four to six digits long. When students' names are entered by means of a utility program, the computer assigns the numbers and allocates space in the student record file.

DEMO numbers are the digits 1-9. The computer recognizes them as different from student numbers and does not collect data on the responses made when they are used. Otherwise it treats them exactly like student numbers, keeping track of value weights, switch settings, occupations retrieved, and so on, and storing the data in the files indexed by them.

Student numbers are to be used only by the students they are assigned to, one to a customer. The numbers are coded in such a way as to protect them from unauthorized use. But the nine DEMO numbers are supposed to be used over and over. They have been set aside for counselors' convenience and for demonstrations. Since there are only nine of them, they must be kept in circulation.

Counselors should not ask for a student number for their private use. The computer tallies all responses occurring under student numbers for research purposes,and counselors' interactions must not be mixed in with those of students.

If, then, the DEMO numbers must be kept in circulation and you cannot have a student number, how can you have a private number of your own? The answer is that a special utility program will allow you to use a DEMO number as if it were a temporary private number. The procedure is discussed later under "Signing On."

Student Status

The computer keeps track of where students are in their progress through SIGI so that it can start them in the right system when they sign on. This is done by incrementing the student status counter every time the student completes a system. The status is stored in the student record between sessions, and of course the student cannot change the status except by completing a system. A counselor using a DEMO number, however, can set the status to any value he wishes. This means that the counselor can enter any system as a novice without first having to pass through the systems that precede it.

Table I shows the point at which interaction begins for the various status settings. You should memorize the table or have it with you when you sign on with a DEMO number. Note that setting status equal to 7 allows you to go to any system as an initiate. This is not the same thing as going to

TABLE I

VALUE OF STATUS FOR VARIOUS STARTING POINTS

Value of status	Systems completed	Starting point
0	None	INTRODUCTION
(1)*		
2	VALUES	LOCATE
3	VALUES, LOCATE	COMPARE
4	VALUES, LOCATE, COMPARE	PREDICTION
5	VALUES, LOCATE, COMPARE, PREDICTION	PLANNING
6	VALUES, LOCATE, COMPARE, PREDICTION, PLANNING	STRATEGY
7	All	Any system as an initiate

*For internal system use only

a system as a novice, since the initiate bypasses some of the explanatory and teaching material that the novice is exposed to. Therefore if you wish to enter the system as a novice, you must set the status to the proper value.

If the version of SIGI at your college does not have a Prediction system, the computer will not accept a status of 4.

The Terminal

Figure 3 shows the keyboard used in sending messages to the computer. Some keys should NEVER be used in SIGI. These are the control keys (on the actual terminal they are black) that occupy the first two rows of the keyboard; TAB, EOM, CTRL; and the seven keys at the top right. The computer generally ignores "illegal" responses, but striking one of the control keys may cause your program to bomb, forcing you to start over.

During the brief sign-on procedure, the alphabet keys, number keys, and RETURN key are used. Thereafter, during the interaction with SIGI, all responses are made by means of the ten digits in the bank of keys at the lower right, or by pressing NEXT. The key marked RUBOUT is activated whenever you have to enter a number, such as the identification number of an occupation. PRINT is activated whenever the display says that you can get a copy of what you see on the screen. The alphabet keys are not used in SIGI.

Signing On

Setting status of DEMO numbers. Suppose that you want to sign on to SIGI with one of the DEMO numbers. You would first ask the person monitoring the system to assign you a DEMO number that is not being used at the moment by someone else. Then follow the steps in figure 4A to sign on with that DEMO number at any unoccupied terminal. The procedure allows you to begin in any system as a novice without first going through the systems that precede it, or to begin as an initiate. The procedure consists of two steps, one to set the status of your DEMO number and the second to run SIGI with the number.

The command RUN RECORD calls in a program named RECORD that can execute a number of functions. One of these, DEMO, sets the status of your DEMO number to any value you request. At the same time it inserts in the record file for your number a set of dummy value weights and enough other data to allow interaction to proceed. (Of course these value weights are not _your_ value weights.)

When the DEMO function has done its work, you can execute the SIGI function to command the computer to run SIGI, using your DEMO number.

DEMO numbers give you flexible control over the SIGI system. Do you want to start from the beginning in the manner of a new student? Set status at 0. Do you wish to enter COMPARE for a specific item of occupational information? Set status at 7 (initiate) and go from the menu to COMPARE. Do you want to help a student with the explanatory material in LOCATE? Set status at 2 and you will enter LOCATE as a novice and will consequently be exposed to all the interpretational materials.

In this handbook each chapter that is devoted to an individual SIGI system contains a section on helping the student at the terminal.

It tells you the status to use when you are counseling students about problems associated with that system.

Accelerated path through SIGI. Having control over the status of DEMO numbers allows you to take an accelerated path through SIGI for demonstration purposes. The procedure is shown in figure 4B. It consists of setting status to 7 (initiate) and then immediately changing the arbitrary value weights inserted by the DEMO program to the true weights of the person at the terminal. That done, go from system to system in the order that a novice would encounter them. This path bypasses much explanatory and teaching material, and it necessitates your returning to the menu every time you complete a system. But it allows an overview of SIGI when time does not permit the full tour of the novice path.

Keeping a DEMO number out of circulation. An occasion may arise when you have to sign off temporarily and want to begin exactly where you left off when you return. For example, the first time you go through SIGI as a novice, you will want to set status at 0 so that you can experience everything a new student does. Suppose you cannot go all the way through in one session.

In that case tell whoever is monitoring the DEMO numbers (or leave a note) not to use your DEMO number until you return. Then, when you sign on again, follow the procedures in figure 4C. These are the regular sign on steps that are used for student numbers. The computer will treat your DEMO number like any other number without altering the information left in your record file from your earlier interaction.

Do not make a practice of keeping DEMO numbers out of circulation.

Signing Off

There are no special sign off procedures for DEMO numbers. Sign off is one of the options that the initiate can choose from the menu display to which he returns after completing any system. The novice is also given the option of signing off upon completion of a system. If you walk away from the terminal without signing off, your program is automatically aborted after 20 minutes. Try always to go through sign off in order to avoid idle terminals.

Printouts

As you go through SIGI, you will notice that certain displays allow you the option of getting a hard copy reproduction of what appears on the screen. For some key displays, getting a printout is mandatory. These printouts are the only documentary avenue of communication that you have with your students. This handbook reproduces examples of the displays that can be printed (except those concerned with financial aid, which are different at each college), and you will want to look them over as part of the process of becoming familiar with SIGI.

Confidentiality of Student Records

Privacy is an important element in the assumptions that underlie SIGI. We believe that some students will behave differently when they know that their responses are private from the way they would behave otherwise. We found support for this assumption in our pilot study. Some male students explored traditionally feminine occupations, such as nursing, and some women students explored engineering or similar occupations. In order to preserve the confidentiality of the records, the students' SIGI numbers are coded, making accidental use nearly impossible. We also promise students that their records will be kept confidential except for the purposes of research conducted by Educational Testing Service.

Counselors, of course, are bound to respect this pledge. This puts you at a slight disadvantage in the counseling situation if students do not wish to share their printouts with you. We are convinced, however, that the advantage to the students more than makes up for this loss. Many students would feel compelled to make what they perceive as "socially desirable" responses if they thought everything they did at the terminal was open to inspection.

Actually, the student record contains very little information of use to a counselor. Nearly all traces of what the student did in a session are wiped out when he signs off. The only information that is stored is what is necessary to operate SIGI.

Using the Handbook

This is enough to get you started. At your first opportunity, ask for a DEMO number not in use and get on the terminal. Set the status at 0 and go through the system fairly rapidly as if you were a student. Then read the remaining chapters in the handbook and return to the system as a counselor. By using the DEMO sign-on routine, you can access any system you want as an initiate or a novice. Test the system thoroughly to see how SIGI can fit into your counseling program.

Except for Chapter X, which is a generalization of the decision-making model embodied in SIGI, each of the chapters that follow concerns a different system. They contain a brief description of what the student does at the terminal, reproductions of the printouts that the student can get, and our conjectures as to the sort of problems that students may have and ways for counselors to deal with them. We say "conjectures" because as yet we have almost no experience with SIGI in the counseling context. We expect large portions of this handbook to be rewritten as you accumulate the experience we lack. Therefore, for the time being use the handbook as a guide, not as a bible.

System	What the student does	Step in the decision-making process
(Introduction)	Learns concepts and uses of major systems	
1. VALUES	Examines 10 occupational values and weights the importance of each	Find out what you want
2. LOCATE	Puts in specifications for 5 values at a time and gets lists of occupations that meet the specifications	Find out where you can get what you want
3. COMPARE	Asks questions and gets specific information about occupations of interest	Get information for judging the advantages and disadvantages of your options. Narrow down your list of options.
4. PREDICTION	Finds out probabilities of getting various grades in key courses of programs that prepare for occupations	Assess the probabilities of success for each option
5. PLANNING	Sees the steps to be taken to prepare for an occupation, including the program at the local college	Plan a course of action for each option
6. STRATEGY	Evaluates occupations in terms of the rewards they offer and the risks of trying to enter them	Apply a rational decision-making strategy to occupational choice

FIGURE 1

The SIGI systems and their place in the decision-making paradigm.

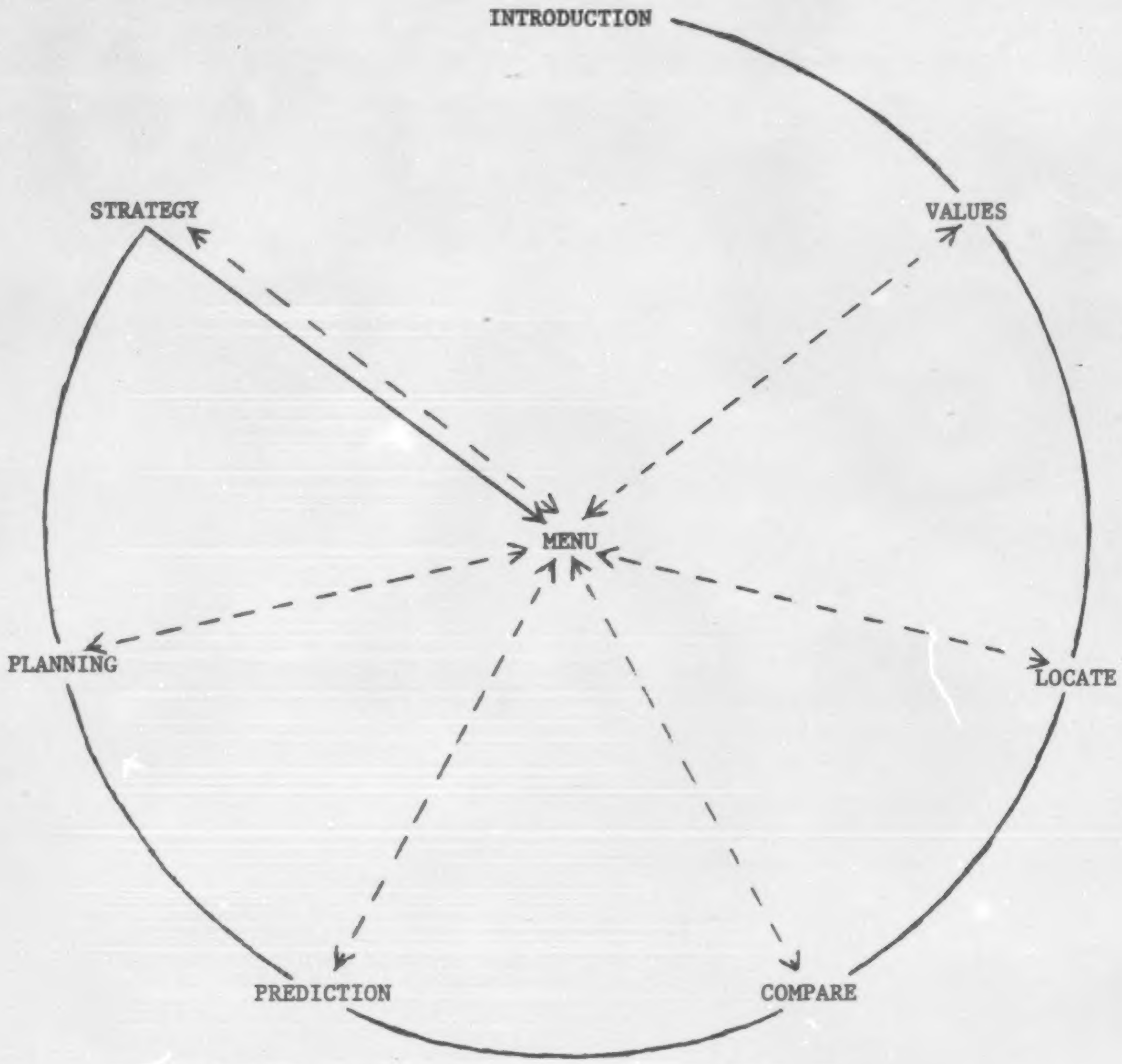
INTRODUCTION
VALUES
STRATEGY
MENU
PLANNING
LOCATE
PREDICTION
COMPARE

FIGURE 2

Paths through SIGI. The novice (solid line) must go through the systems in sequence until he has completed STRATEGY. He then becomes an initiate (broken line) and goes to the "menu," which allows him to enter any system regardless of its place in the sequence.

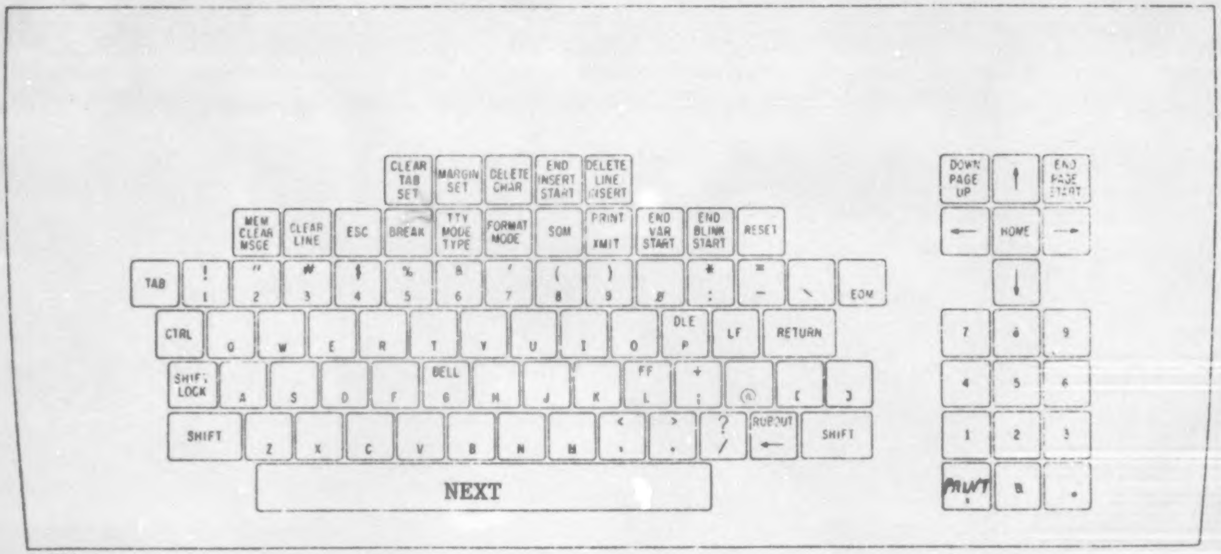
CLEAR TAB SET
MARGIN SET
DELETE CHAR
END INSERT START
DELETE LINE INSERT
MEM CLEAR MSGE
CLEAR LINE
ESC
BREAK
TTY MODE TYPE
FORMAT MODE
SOM
PRINT XMIT
END VAR START
END BLINK START
RESET
TAB
EOM
CTRL
DLE
LF
RETURN
SHIFT LOCK
BELL
FF
SHIFT
RUBOUT
SHIFT
NEXT
DOWN PAGE UP
END PAGE START
HOME
PRINT
B-1006 A

FIGURE 3

The terminal keyboard. During the interaction with SIGI only the following keys are used: the 10 digits and PRINT key on the right, the NEXT bar, and occasionally RUBOUT. During sign on or in running the DEMO routine, the letters and RETURN key are also used. The two top rows of the keyboard and the top seven keys on the right are never used.

1. Type HELLO 40/1 (then press the key marked RETURN). (NOTE: There must be a space between HELLO and 40/1.)
   The computer will respond PASSWORD:

2. Type SIGI (then press RETURN). (NOTE: The letters SIGI will not be displayed on the screen.)
   The computer will respond READY.

3. Type RUN RECORD (then press RETURN). (Note space between RUN and RECORD.)
   The computer will respond RECORD - SIGI STUDENT RECORD MANAGER
   VERSION X.XXX
   AUTHORIZATION?

4. Type IXNAY (then press RETURN). (NOTE: The letters IXNAY will not be displayed. Keep the password IXNAY confidential.) The computer will respond FUNCTION?

5. Type DEMO (then press RETURN).
   The computer will respond DEMO NUMBER?

6. Type the DEMO number (1-9) that you are using (then press RETURN).

7. The computer will respond STATUS?

8. To start from the beginning as a novice type 0
   To start in LOCATE as a novice type 2
   To start in COMPARE as a novice type 3
   To start in PREDICTION as a novice type 4
   To start in PLANNING as a novice type 5
   To start in STRATEGY as a novice type 6
   To start as an initiate type 7
   (then press RETURN).
   NOTE: A status of 1 is not used.

   The computer will respond FUNCTION?

9. Type SIGI (then press RETURN).
   The computer will respond SIGI - VERSION 1.6
   STUDENT NUMBER?

10. Type the DEMO number that you are using (then press RETURN).
    SIGI will now begin.

FIGURE 4A

Procedures for setting the status of a DEMO number and running SIGI. Steps 1-8 call in DEMO, a subroutine of a utility program called RECORD, in order to set the status. The computer inserts dummy data in the file indexed by the DEMO number, enabling SIGI to begin at the proper place. Steps 9 and 10 command the computer to run SIGI.

The information in this figure must be kept confidential in order to protect the RECORD program from unauthorized use.

ACCELERATED PATH THROUGH SIGI

1. Use a DEMO number (1-9).
2. Run the DEMO program and set status at 7.
3. On the introductory displays, enter any enrollment status, age, and sex you want.
4. On the "menu" display choose #2, "VALUES."
5. Do NOT play the Values Game. When asked, respond #2, "no."
6. Respond #2, "Yes," to question about changing interest field.
7. Select desired field.
8. Follow instructions on displays of values profile in order to add to or subtract from the displayed weights. Change the weights so that they reflect your own values.
9. When reweighting is completed, you will return to the "menu" display.
10. TO TAKE AN ACCELERATED PATH ALL THE WAY THROUGH SIGI, choose #2, "VALUES," again. Play the Values Game this time, since your own values weights will be used in the interaction. Upon completion of each system, you will return to the "menu." Each time select the next system in the sequence.
11. TO TAKE AN ARBITRARY PATH, enter any system you want.
12. Upon entry into COMPARE, PLANNING, and STRATEGY you will see a "Reminder list" of occupations "that interest you." These are arbitrary. When asked if you want to select an occupation from the list, respond #2, "Some other SIGI occupation." You will then select from the printed hard-copy list at the terminal.
13. At many points in each system you will be asked if you want to see certain explanatory sequences. Make whatever response you want. Bypassing the sequences will accelerate your progress through SIGI.

FIGURE 4B

Procedures for taking a shortened path through SIGI. Steps 1 and 2 permit signing on as an initiate. Steps 3-9 replace the dummy data in the DEMO file with data true for the person at the terminal. Steps 10-13 provide a path through SIGI that enters all systems and yet bypasses many explanatory and "teaching" displays that a novice would encounter. The procedures may be used whenever insufficient time is available for demonstrating the complete system.

1. Type HELLO 40/1 (then press the key marked RETURN).
   The computer will respond PASSWORD.

2. Type SIGI (then press RETURN). (NOTE: The letters SIGI will not be displayed.)
   The computer will respond READY.

3. Type RUN $SIGI (then press RETURN). NOTE: The $ sign must be typed in this message.)
   The computer will respond SIGI - VERSION 1.6
   STUDENT NUMBER?

4. Type the student number (then press RETURN). If a DEMO number is entered, SIGI will treat it in the same manner as a student number, using for its interaction whatever information is stored in the file for the number.

FIGURE 4C

Standard sign-on procedures. Counselors who have signed on with a DEMO number and have been forced to sign off before completing their interaction may take their DEMO number out of circulation pending their return. If they then sign on again with these procedures, the computer will not overwrite their record with dummy data as in the DEMO subroutine. DEMO numbers must be kept in circulation as much as possible, as there are only nine of them.

CHAPTER III

INTRODUCTORY SEQUENCES

STUDENT NUMBERS

Each college will develop its own procedures for deciding who will be allowed to use SIGI. Eligible students will be given their SIGI number before they sit down at the terminal.

The computer assigns the numbers. Some authorized person at the college will use a special utility program to enter the names of SIGI users. The computer then assigns the first unused number to the first name, the second unused number to the second name, and so on. Some extra "check" digits are generated at random by the computer and inserted into the student number to protect it from accidental or unauthorized use. When all the names have received their numbers, the computer will print out a list of the names with the numbers assigned to each. The list can be updated at any time.

The list must, of course, be kept confidential so that only a student and the keeper of the list knows what a student's number is.

Signing On

In order to sign on, students type, "HELLO 40,1" on the terminal keyboard, and press the key marked RETURN. If they have made a mistake, such as inserting a space after the comma, the computer tells them that the command is illegal, and they start over. If their entry is acknowledged, the computer displays "PASSWORD:" on the screen. Students type, "SIGI" and press RETURN. The computer responds with "WELCOME TO RSTS/E V05B TIME SHARING," or an equivalent message, and then displays "READY." The students type, "RUN $SIGI" and RETURN. (The dollar sign must be typed as part of the message; use the shift key in typing the dollar sign.) If there has been no mistake, the computer displays "STUDENT NUMBER?" Students type in their number, press RETURN, and are thereafter in SIGI. The computer rejects typographical errors or misspellings, and rejected commands have to be entered over again. Also, the first frame in the SIGI sequence displays the name corresponding to the student number that was entered and asks for confirmation. If the name is wrong, the student has to get help from the person monitoring the terminal room. Of course, no student should run with another student's number.

Note that signing on really occurs in two steps. First, a user signs on to the RSTS/E system and instructs the computer to run SIGI, using the procedures in the previous paragraph. Then the user signs on to SIGI, using his student number. Signing on to the RSTS/E system requires using letters and numbers on the keyboard. Interaction with SIGI, however, requires only numbers and the NEXT bar. Using the numbers in the bank on the lower right side of the keyboard helps prevent mistakes in SIGI responses. NEVER USE A BLACK CONTROL KEY ON SIGI.

WHAT THE STUDENT DOES IN THE INTRODUCTORY SEQUENCE

New Students

Students signing on for the first time (status 0) enter their age, sex, and enrollment status at the college. Age and sex are examined for possible use in the Prediction system. The enrollment status determines whether or not certain displays will be shown that are directed to students who have already taken some college courses.

The students are now introduced to the major themes of SIGI. They are asked about their knowledge of their values, their command of occupational information, their ability to predict their grades realistically, and the state of their plans for getting into their chosen occupation. Finally, the introduction concludes with a short interactive teaching sequence. It tells the student that the first step in the SIGI decision-making paradigm is to find out what they want from an occupation--to assess their values. Students then move into the VALUES system with no option to sign off.

Returning Students

Students who have been on SIGI before (status 1-7) go through the standard sign-on procedures. Next, they enter the introductory sequence to be asked about their enrollment status, since it may have changed since their last session on SIGI. Also, they are asked about their age again. Then they go directly to the SIGI system for which they are scheduled next.

PRINTOUTS THE STUDENT CAN GET

Students may get a printout of the display showing how they responded to the questions about values, information, prediction, and planning. Figure 5 reproduces this display.

THINGS FOR THE COUNSELOR TO LOOK FOR

Students are not likely to have any problems due directly to the introductory sequence. They must continue at least through the Values system before signing off, and any misgivings they may have will probably center on the systems themselves rather than on the displays that introduce the systems.

USE OF THE PRINTOUT IN COUNSELING STUDENTS

Some students may feel uneasy because they answered the four questions, summarized in figure 5, as they did. In our pilot study, very few students claimed extensive or exact knowledge about the dimensions explored. Most students reported only a nodding acquaintance with them. If students are distressed because they have not come to grips with such important matters, it may comfort them to know that most of their colleagues are in the same boat. The printout may also be useful in persuading students to go to SIGI for help with their values, lack of information, or vagueness of their plans.

To summarize what you've said about yourself:

Values:	"I have seldom thought about my values, but I would know what I want if I saw it."
Information:	"I need a lot of information about occupations that might fit my values."
Prediction:	"I have only a general idea of my grades in one or two programs."
Planning:	"I have a general idea of which program would be best, but I am not sure what other steps are necessary to reach my occupational goal."

You will be able to get copies of certain displays as you go through SIGI. This is the first.

If you want a copy of what you see now, press PRINT.

If you do not want a copy, press NEXT.

FIGURE 5

Printout available in INTRODUCTION. It records the students' responses to questions about their knowledge of their values, the extent of their occupational information, their ability to predict their grades, and the quality of their plans for entering an occupation. The material in quotation marks varies with responses the students made to earlier displays. The ones shown in the figure are more or less typical.

CHAPTER IV--VALUES

Any procedure for decision-making implies some principle for choosing. Otherwise, how is the individual to make order out of the rabble of impulses that beset him? He is at their mercy unless he recognizes that, essentially, he must choose between competing values. Neither suppressing nor blindly obeying his impulses, he can control them by bringing them under the rule of reason, giving each "equal time" and attention. The individual must hold himself open and receptive to different values, allowing each to speak to him as loudly as the others. This process involves active and systematic exploration of competing values so that he can answer the central question, "What do I want?"

Therefore values are at the heart of the SIGI system. They provide the dimensions along which students analyze their own desires and along which they construe occupational characteristics. They constitute the theme that runs through the separate sections of SIGI, tying them together into a comprehensive whole.

The Values system is the medium through which students explore their wants and desires and sort out the demands of each.

From time to time, you have probably asked students about their values, that is about the rewards and satisfactions that are important to them in an occupation. Some students are able to name up to half a dozen meaningful constructs. Others bog down after mentioning two or three. Still others shrug and answer vaguely that they want a "good job." As you pursue what they mean by a "good job," you may drag out of them a few more enlightening phrases: "I want to make a good living... a desk job... but no math..."

These sparse statements are meaningful, but you wonder--considering the difficulty you had in eliciting them--whether they are comprehensive enough, whether the student has thought about and mentioned everything of importance to him. You can test this even without a systematic canvass of all dimensions by posing to him one construct he has not mentioned: For example, you might ask, "How about security? Would you want a desk job with no math that paid a high salary, if the job was one of the first to be wiped out in a business recession, or if it was just seasonal, or depended on the success of a very risky venture?" He might say, "No, I want a steady job." So you might continue and try him on other values, finding several others that he recognizes as important when you suggest them--but he would not have thought of on his own.

Thus, one of the purposes of the Values section of SIGI is to make sure that each student has considered a broad range of values. The ten dimensions used are not exhaustive, but they have been carefuly chosen on several criteria: they are relatively independent; each one is of considerable importance to some students; and all of them are relevant to occupational information, providing dimensions along which occupations in SIGI are differentiated.

A second purpose is clarification of values. What was the significance of a "desk job" to the student in the example used above? Was he concerned about the prestige of the occupation? Physical demands? Something pertaining to the nature of the work? When a student says he wants a job that is "not boring," he is using an individual language that is not helpful in career decision-making until it has been translated into an occupational language. If you press him on what he means, he may say, "I don't want to do the same thing all the time," which can be interpreted along the dimensions we call Variety. Or he may refer to a Field of Interest: if math is boring to him, it is to be avoided. But is there some field of activity to be sought? Perhaps working with people (for example, interviewing in a personnel office) appeals to him, and we note that he has interest in the Personal Contact Field. Expressing a desire for a job that is not boring is of no help in identifying occupations. Specifying some level of Variety or of work in the Personal Contact field of interest can help the student to identify occupations that are worth further examination and also help him to evaluate their relative desirability.

Defining each value dimension in operational terms, as SIGI does, helps to clarify what is important to each student. Sure, he wants to help others. But does he want to devote his working life to altruistic service? Doe he want to work directly with people to improve their health, education, or welfare?

A third purpose of the SIGI Values Section is to stimulate close scrutiny and examination of values. All the values are expressed in positive terms, and all or most are likely to appear desirable to many students.

Thus, some students may give all, or almost all, the values a high weight. But students who are too demanding, who want all there is of everything, will find that no occupation can satisfy them. Generally, if constrained to make judgments between competing values, students will probe more deeply into the relative importance of various satisfactions and rewards. This is the reason that SIGI requires, eventually, that students distribute a fixed sum among the values. Some values remain crucially important under this close scrutiny: the students will not reduce by one iota the weight attached to them. But to retain the full weight attributed to the most important values, they are willing to ease off on some of the others.

Thus, most students are able to handle quite readily the constraint that the value weights must sum to 40. An occasional student, however, might be troubled by it. Perhaps he doesn't want to face the conflict involved in determining what is really most important and what might be sacrificed. Another student might miss the whole point of probing more deeply into values, of weighing one against another, of confronting and resolving dilemmas. That is why, as we point out later, you may want to check the profile of values weights for reasonableness--to pick up a situation in which a student has simply made arbitrary adjustments to make the sum equal 40.

In short, then the purposes of the Values section of SIGI are (1) to insure that each student explores and considers a broad range of occupational values; (2) to clarify the rewards and satisfactions that students seek in an occupation; (3) to stimulate close scrutiny, examination, and relative judgments of the importance attached to each value.

WHAT THE STUDENT DOES

Novices

Novices first see a sequence showing how they will use numbers to indicate the importance they attach to a value. They then see an operational definition of each of the ten SIGI values and assign it a weight ranging from 0 (no importance) to 8 (maximum importance). The ten occupational values are

High Income
Prestige
Independence
Helping Others
Security

Variety
Leadership
Work in Main Field of Interest
Leisure
Early Entry

The definitions are shown in figure 6.

Before assigning a weight to Work in Main Field of Interest, the students choose the field that interests them most. The six interest fields are shown in figure 7. Then, after weighting the values, the students play a game in which they choose between two imaginary jobs, each featuring one of the values. As they "work" at the chosen job, they are confronted with another choice this time between the value featured in their job and one of the remaining eight values. Should they sacrifice the value featured in their job in order to obtain some other value? They make a choice and are immediately faced with a similar dilemma involving another value. At the end of each game, the students receive feedback pointing out inconsistencies between their choices during the game and the relative weights previously assigned to the values that figured in the choices.

When they have played as many games as they wish, the students reweight the values, this time with the restriction that the sum of the weights must equal 40. Values are the governing principle of SIGI, and the program takes some pains to make sure that the final value profile is not just an artifact of making the sum total 40, but is truly representative of what the students think about their values.

Finally, students respond to a short sequence reinforcing the concepts that values differ in importance to them, that the differences can be expressed numerically, and that values play a large part in occupational choice. Novices can then sign off or go directly to LOCATE.

Initiates

Initiates bypass the weighting of values one at a time. Instead, they are asked if they want to play the values game again. If they do not, they are given an opportunity to change the field of interest that they had selected previously. They next see the display showing their ten value weights just as they left them the last time they were in the Values system, with the sum totaling 40. They may change any weights they wish, so long as the sum eventually returns to 40. When they are satisfied that their weights faithfully represent their state of mind, they leave the Values system without going through the teaching sequence again.

The path of the initiate is much shorter than that of the novice.

PRINTOUT THE STUDENT CAN GET

Students may bring with them for discussion a printout of their value profile with the sum totaling 40, as reproduced in figure 8. It shows in graphic form the ten values and the weight assigned to each. The students must get a printout of this display, although they are, of course, under no compulsion to share it with anybody.

THINGS FOR THE COUNSELOR TO LOOK FOR

1. Understanding the Role of Values

Students need to understand that the computer will give them misleading information if their value profile and interest field selection do not represent their true feelings. The places where students may go wrong are LOCATE, where the computer retrieves occupations that fit a set of value specifications defined by the student; and STRATEGY, where the computer rates occupations in terms of their potential to satisfy a set of value weights. Also, in COMPARE students are urged to ask about the values dimensions of occupations. Students may not realize the extent to which their value weights control other systems in SIGI. Therefore, by use of internal consistency checks and pointed questions or reminders, SIGI tries to keep them from being too casual or impatient in assigning representative weights.

2. Understanding the Concept of Values

The idea of thinking about occupations in terms of abstract qualities, such as values, may be new to some students. We have tried to make the values as concrete as possible by putting the definitions in operational terms. Also, we use the word values in a rather simplistic way as approximately equivalent to satisfactions and rewards. We do not attempt subtle discriminations between intrinsic satisfactions and extrinsic rewards, nor do we try to push the students--in the course of interactions with SIGI--to any in-depth analysis of values and their role in life. It is possible, however, that some students will be stimulated to enter into such discussions "off-line." They may want to discuss values not only in reference to career decisions but also in regard to other contexts.

If students are uncomfortable with the concept of values, you can point out that in SIGI values are satisfactions and rewards. They answer the question, "What do I want from my occupation?" It may help further to explain that values are not "in" an occupation. Rather, an occupation may provide an opportunity to satisfy a value that is important to the student. It is therefore necessary for the student to identify what would satisfy him.

Some reflective students may think SIGI's use of values is superficial. That may be true at a philosophical level, but the values dimensions do differentiate between students in a way that is relevant to occupational differentiation. The pilot study of SIGI showed that the students perceived the ten values as indeed distinct from one another; that student profiles varied greatly on the values dimensions; and that the occupations were also distinct from one another in terms of the values dimensions used in SIGI.

3. Misunderstanding the Values Game

Once in a while students may fail to realize that the "jobs" in the values game are fictitious, each constructed to represent a "pure" manifestation of one value. If this comes up in discussion, you should assure the students that the jobs are imaginary and have no counterparts in the real world. You can explain that the purpose of the values game is to get students thinking about values, not jobs.

4. The Student Is Uncertain about His or Her Value Weights

Students thinking about their values for the first time may be very uncertain about their true feelings and, consequently, about the accuracy of the weights they assigned to the values. They would probably welcome a counselor's help. Our experience with the effect of SIGI on students is so limited that we cannot offer guidelines for the best way to go about discussing values. The following suggestions may be helpful, or they may not.

Examine behavior. Students can be urged to examine their behavior as an expression of their values. For example, Helping Others may seem appealing because of its social approval, and students may be tempted to weight it higher than their true feelings warrant. If their behavior, however, shows little tendency to help others, they may be willing to reconsider their judgment about the value. Prestige may represent the opposite condition, for to some people a desire for prestige is unworthy. Yet students may find themselves behaving in ways that solicit the respect of others, and may then be led to reevaluate their feelings.

Stability of values. Students may worry about the stability of their values. They may suspect that their feelings about them will change and that consequently the weights they assign today will be invalid tomorrow. You can offer them some assurance on this matter. It is certainly true that the relative importance of the values will change in time. For example, once a student has entered an occupation, Early Entry becomes negligible in importance; High Income may increase in importance with marriage and children. On the other hand, most junior college students are probably mature enough for their values to be fairly stable. They will not change from moment to moment.

You can also reassure students that they can change their value weights in SIGI whenever they think it necessary. All students entering STRATEGY are invited to review their values profile; initiates always have the option of returning to the Values system to readjust their weights. Indeed, you may want to emphasize that all students should review their values periodically so that they will be alert to changes that might affect their career decisions and plans.

5. The Student Is Not Sure That He Chose the Right Interest Field

Before assigning weight to Work in the Main Field of Interest, students select from the six fields (figure 7) the one that interests them most. Students may not be sure that they selected the right field. Either of two conditions may exist:

(1) The students are interested in some occupation, but do not know which of the SIGI fields it belongs to. You can tell these students that they should select the field in accordance with their interests, not in accordance with preconceptions about some particular occupation. The object is to find occupations that fit a desired field, not to guess which fields fit an occupation. Many occupations belong to more than one field. For example, most of the teaching occupations are classified in the Verbal field and the Personal Contact field, as well as the field of the subject taught. Therefore, if students are interested in the occupation art teacher, you can tell them that it will be retrieved if they have selected either the Verbal, the Personal Contact, or the Aesthetic field. Similarly, many of the engineering occupations are classfied in both the Scientific and Technological fields.

(2) The students are completely at sea with respect to the field their interests lie in. In this case, you may again get students thinking in terms of their behavior. What sort of activities do they enjoy and initiate? It is doubtful that administering an interest inventory will help much. There is evidence that students' self-estimates are as good as the inventory, if not better.*

6. Effect of Inconsistency Messages

A few students who participated in the pilot study of SIGI reported that receiving an inconsistency message in the values game had an unsettling effect on them. When a student chooses between two values in the game, the computer checks to see whether the rejected value had been weighted higher than the accepted one. If such was the case, the computer notifies the student of the inconsistency in a display at the end of the game.

As a counselor, you should try to find out whether the students' problem is due merely to the disturbing effect of the message or to an underlying uncertainty about values. Ask the students how confident they are about their value profile as finally adjusted. Does it truly represent their feelings? If the students seem fairly confident, you can tell them that an occasional inconsistency message is nothing to worry about. The values game is not a test to see whether the students can remember how they weighted their values. It is an attempt to put values in a behavioral setting. Students should not be surprised that a value weighted in the abstract may look somewhat different when action is required. Moreover, if the two values that were involved in the inconsistency had been assigned nearly equal weights, students might well feel differently about their relative strengths in different situations. The dilemmas are meant to be difficult to resolve in order to stimulate hard thinking about the importance of competing values. In any case, the inconsistency message should not be regarded as criticism, but as useful information.

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* Lila Norris and Martin Katz, *The Measurement of Academic Interests, Part II: The Predictive Validation of Academic Interest Measures*, College Board Research and Development Report 70-71, No. 5, and ETS Research Bulletin 70-58 (Princeton, New Jersey: Educational Testing Service, 1970).

See also Robert H. Dolliver, "Strong Vocational Interest Blank Versus Expressed Vocational Interest," *Psychological Bulletin* 72 (2): 95-107, August, 1969.

On the other hand, some students may construe the inconsistency message as saying, "You don't know your own values." This may be true. They may be troubled by unresolved conflicts in their value systems, and you may have to help them think through such conflicts.

USE OF THE PRINTOUT IN COUNSELING STUDENTS

Checking the Profile With the Student

If students show you the printout of their values profile (figure 8), you may use it to get at some of the concerns discussed in the previous section of this chapter. While you have the profile in front of you, ask the students the questions that the computer asks before it releases students from the final weighting of values:

1. Does the student's most important value have the greatest weight? Ask the students, "Which value is most important to you?" Check the profile to see if the student named the value with the greatest weight.

2. Does the student's least important value have the smallest weight? Again, the student's response should be checked against the

profile.

3. Could a stranger tell how important a value is to the student by looking at its weight?

The students' answers to the first two questions should agree with their values profiles. However, you can expect some inconsistencies with respect to the values in between. The differences between weights of 3, 4, and 5 (all in the medium range) are not nearly so distinctive or memorable as the difference between weights of, say, 1 and 7. Students might easily weight a value 3 one time and 4 another without violating their true feelings, and you should not expect exact correspondence between what is said in discussion and what is done at the terminal; the important thing to look for in the printout is that it be generally faithful to the students' true feelings.

Checking the Profile for Reasonableness

Sometimes a profile may just not "look right." For example, in the pilot study one student weighted each value at 4 as an economical way of making the sum total 40, as required.

Such a fishy looking profile is easy to detect. Other instances of misweighting are harder to discover just by examining the printout. As you talk with students, see if they keep referring to a particular value as very desirable. Then check the printout to see if that value is weighted heavily. In the pilot study, one student wiped out her most heavily weighted value in the course of reducing the sum to 40.. This error would have gone undetected except for the accident that in an interview the student mentioned the value as one she particularly wanted to satisfy in her work.

If students do not share their printout with you, it will be difficult to find out whether they have adjusted their values correctly or not. Nevertheless, the matter is so important that it is worth investigating. At the least, you can stress its importance and urge students to review their printout with care and correct their weights at the terminal if they are wrong.

HELPING STUDENTS WEIGHT THE SIGI VALUES

If it happens that students need help in getting their value weights right, you can "talk them through" the weighting process. This could be done in the office or at the terminal.

Pencil and Paper Weighting

Using the definitions of the values in figure 6, you can discuss each value with the students and ask them to weight it. The scale used by SIGI for this purpose is shown in figure 9. Let the students point to the place on the scale that represents the assigned weight. Write down the corresponding number on a piece of paper, together with the name of the value.

Some of the values deserve special attention during the discussion of the definitions.

High Income. High Income is defined in SIGI as income beyond what is required to meet basic needs. Needs may vary considerably from person to person, depending on such conditions as age, health, family size, place of residence, education plans, and so forth. A further complication is the fact that many young students have almost no perception of the amount of income required for needs. They have been in a dependent position all their lives and are too inexperienced to know whether a specified income would make them kings or paupers. You may want to help students estimate their needs, separate their needs from their wants, and reach a clearer understanding of High Income as a value.

Leadership. In SIGI, Leadership is linked with responsibility. SIGI does not treat the opposite value, freedom from responsibility. Some students want the latter. The counselor can advise these student to give Leadership a low weight on SIGI. If freedom from responsibility is an important value to them, you can advise them to use COMPARE to ask about Leadership opportunities in occupations of interest to them. They can then exclude occupations which involve a substantial amount of leadership and responsibility. (See figure 14, Chapter VI for the list of questions in COMPARE.)

Work in the Main Field of Interest. This value is treated differently from the others in that weighting it occurs in two stages. First, students select an interest field (figure 7). They then weight the importance of working in that field.

You should make sure that students do not think "Work in the Main Field of Interest" is always the same thing as "interesting work." There should normally be a better chance of doing interesting work in one's main field of interest, but there is no guarantee of it. For example, Marie Curie described days in a "miserable old shed...stirring a mass in ebullition, with an iron rod nearly as big as myself." It was important to her to work in her "Main Field of Interest"---scientific. But the actual labor of trying to extract pure radium from pitchblende residue was not "interesting work."

Early Entry. Early Entry confuses some students because of its tie-in with education. They think of education in positive terms. It is true, however, that getting an education is usually the main reason for deferring entry into an occupation. Therefore, if students weight Early Entry high, they are for all practical purposes weighting desire for education low. Consequently, Early Entry is the reverse of some of the other values with regard to education: the more education you are willing to take, the lower you weight Early Entry.

You should emphasize to the students that they are weighting the importance of entering an occupation without delay. Dissatisfaction with their educational experience might be the reason for their desire for quick entry, but their educational experience is not what they are weighting. A person might weight Early Entry high regardless of his feelings about education; for instance, he might have to start earning money immediately out of economic necessity. Although the students' feelings about education are clearly important in weighting Early Entry, you should keep the students' attention focused on their willingness to put up with delays of any sort.

It may also be noted that some students will be torn between a desire for Early Entry and concern for the prestige they associate with occupations that require a great deal of education. It may help to point out that while amount of education is related to prestige, and both are related to High Income, the relationships are far from perfect: the student should weight each of these values independently during the first go-round.

Summing to 40. When students have weighted the ten values separately, add the weights. They must be adjusted so that they total 40. This restriction is necessary because the values have to be judged in relationship to one another. A student can't demand all there is of everything. For example, students might decide that High Income is important enough to deserve a weight of 8. They might feel the same way about Helping Others and Security. Although each is important in itself, are they equally important when compared to one another? One way to find out is to restrict the total weight that can be distributed among all values.

Therefore you should help students distribute this limited resource so that the more important values receive the most weight. The process of distributing the weights should not be hurried. You should be especially alert that students do not falsify the representation of their values in order to make the weights sum to 40. Sometimes sacrifices will have to be made and when students yield on a value, you should ask them whether they are at the same time preserving some other value(s) that they cherish more.

Reweighting at the Terminal

It is much easier to do the reweighting at a terminal, if one is unoccupied. You must use a DEMO number for this purpose, since the student's number does not allow re-entry into VALUES as a novice. Set the DEMO status at 0 in order to see the definitions of the values (an initiate returning to VALUES does not see the full definition). You can discuss each value with the student as its definition appears. The computer will take care of all the arithmetic. It will also print a hard copy record of the final weights.

If reweighting is done at the terminal, the computer will go through the complete SIGI introduction as well as the values game. These can be traversed rapidly, since the responses are of no importance as long as your only concern is the values weights.

Getting the Reweighted Values in the Student's Record

Counselors must see that students have copies of their new value weights so that they can change the weights stored in their file by the computer. If a student is an initiate, he can go to VALUES as soon as he next signs on. If he is a novice, he will have the opportunity to change the record of his value weights as soon as he enters STRATEGY. It is vital that the record be changed before the student goes through STRATEGY, for the information that the student receives in that system may be quite misleading if the wrong weights are used.

High Income. Some minimum income (enough for survival) is essential for everyone. But beyond that, how important to you are the extras? People have different ideas about how much income is "high." Therefore, high income is not defined here as a specific amount. It means more than enough to live on. It means money to use as you wish after you have paid your basic living expenses. You can buy luxuries and travel first-class.

Prestige. If people respect you, look up to you, listen to your opinions, or seek your help in community affairs, you are a person with prestige. Of course, prestige can be gained in several ways. But in present-day America, occupation is usually the key to prestige. Rightly or wrongly, we respect some occupations more than others.

Independence. Some occupations give you more freedom than others to make your own decisions, to work without supervision or direction from others. At one extreme might be talented free-lance artists or writers who may work without supervision. At the other extreme might be military service or some big business organizations with chains of command which severely limit the decisions that each person can make.

Helping Others. Most people are willing to help others, and show it every day outside of their work. They put themselves out to do favors, make gifts, donate to charities, and so on. This does not count here. The question here is, Do you want Helping Others to be a main part of your occupation? To what extent do you want to devote your life work directly to helping people improve their health, education, or welfare?

Security. In the most secure occupations, you will be free from fear of losing your job and income. You will have tenure--that is, you cannot be fired very easily. Employment will tend to remain high in spite of recessions, and there will be no seasonal ups and downs. Your income will usually remain stable and predictable; it will not vanish with hard times. Your occupation is not likely to be wiped out by automation or other technological changes.

Variety. Occupations with the greatest variety offer many different kinds of activities and problems, frequent changes in location, new people to meet. Variety is the opposite of routine, predictability, or repetition. If you value variety high, you probably like novelty and surprise, and enjoy facing new problems, events, places, and people.

FIGURE 6

Defininitions of the SIGI values as they are displayed at the terminal.

Leadership. Do you want to guide others, tell them what to do, be responsible for their performance? People who weight leadership high usually want power to control events. They want to influence people to work together efficiently. If they are mature, they know that responsibility goes with leadership. They are willing to accept the blame when things go wrong, even though they were not at fault.

Work in Your Main Field of Interest. Some people have only one main field of interest (Scientific, Technological, Administrative, Personsal Contact, Verbal, or Aesthetic); others are interested in two or more of these fields. Some insist that their occupation must be in one of their major fields of interest. Others are willing to work in a field that is less interesting; they feel they can satisfy their main interest in their spare time.

Leisure. How important is the amount of time your occupation will allow you to spend away from work? Leisure may include short hours, long vacations, or the chance to choose your own time off.

To give a high weight to leisure is like saying, "The satisfactions I get off the job are so important to me that work must not interfere with them."

Early Entry. How important is it to you to enter an occupation soon? You can enter some occupations with very little education or training. Other occupations require years of expensive education before you can enter. Do you want to avoid the time and cost of higher education?

If it is important to you to enter an occupation SOON, give Early Entry a HIGH number. But if you are willing to take a lot of education and delay entering an occupation, give Early Entry a LOW number.

FIGURE 6 (continued)

(1) SCIENTIFIC--data, knowledge, observations, analysis, mathematics
Examples: Physicist, chemist, engineer

(2) TECHNOLOGICAL--things, machines, manipulative and mechanical skills
Examples: toolmaker, mechanic, technician

(3) ADMINISTRATIVE--business, finance, records, systems
Examples: accountant, secretary, bank teller

(4) PERSONAL CONTACT--people, selling, supervising, persuading
Examples: salesman, social worker, flight attendant

(5) VERBAL--words, reading, writing, talking, listening
Examples: journalist, teacher, advertising copywriter

(6) AESTHETIC--painting, sculpture, design, music
Examples: artist, interior designer, musician

FIGURE 7

The six SIGI interest fields.

```
       VALUES                                IMPORTANCE
                            None      Slight    Medium      Strong   Highest
                              '----'----'---- ----'----'----'----'----'
 (1) High Income              6     *----*----*----*----*----*
 (2) Prestige                 3     *----*----*
 (3) Independence             5     *----*----*----*----*
 (4) Helping Others           2     *----*
 (5) Security                 6     *----*----*----*----*----*
 (6) Variety                  4     *----*----*----*
 (7) Leadership               4     *----*----*----*
 (8) Interest Field           5     *----*----*----*----*
 (9) Leisure                  3     *----*----*
 (0) Early Entry              2     *----*
                              --
                       Sum   40


    Good enough!

    You may want to look at your Value weights and perhaps change them in
other sections of SIGI.  You will have the chance to do that.

     You will want a copy of this display to look at later.  Press PRINT.
```

FIGURE 8

Printout showing a student's values profile after he has made the sum of the weights total 40. These values weights are used in other systems of SIGI.

```
WEIGHT (IMPORTANCE)

None      Slight      Medium      Strong   Highest
(0)  (1)  (2)  (3)  (4)  (5)  (6)  (7)  (8)
 '----'----'----'----'----'----'----'----'
```

FIGURE 9

Scale for designating value weights.

CHAPTER V--LOCATE

When you think of decision-making, you usually think of making a choice among given options. Which route should you take to St. Louis, which suit should you buy from the rack, which set of student problems should you see to next? Life is often stingy with its options, which tend to be few in number and frequently blurred in outline.

Yet there are judgmental situations in which one of the complicating factors is that the options are too many, not too few. Career choice is one such situation. There are over 800 occupations listed in the Occupational Outlook Handbook, and even when you have eliminated the obvious (to you) clinkers, the number of occupations that remain is bewildering.

Clearly, the decision-making process in such situations must begin with some method of narrowing down the options. You could, of course, narrow down arbitrarily by using a table of random numbers or by taking every twenty-fifth occupation or by closing your eyes and jabbing the index of the Handbook with a pin. But ideally you would like your condensed list to include only those occupations that would have survived a close scrutiny had you had the time to examine the complete array. What occupations would such an ideal list include? How might the list be compiled?

The answers to these questions is the business of LOCATE. As you would expect, values provide the net for screening occupations and catching those that are worthy of further consideration.

WHAT THE STUDENT DOES

Novices

Novices enter LOCATE from VALUES, with or without an intervening sign off. They see their ten value weights carried over from the Values system, only this time ranked in order of importance or weight. They choose any five values to use at a time in the search for compatible occupations, with advice to choose for the first run five with the greatest weight.

They then specify a minimum that they will settle for on each value. For most values the specification is on a four-point scale ranging from "A great amount" to "A less than average amount"; for High Income the specification is on a five-point scale ("More than $20,000 per year" to "Less than $8,000 per year"), and for Interest Field the specification is one of the six interest fields (figure 7, chapter IV). The computer searches all the occupations in SIGI and displays a list of those that meet or exceed the specifications on all five values. If the list is empty, the computer requires students to loosen their specifications until occupations are finally retrieved. If the list is too full (more than 20 occupations), students must tighten their specifications until the number is reduced to a manageable size.

Students then see a sequence showing how the computer screens occupations in order to compile the students' list. This sequence appears only once; if students change the values or specifications to retrieve other sets of occupations, the computer skips the explanatory displays.

After each set of occupations has been retrieved, students may change one or more of the specifications used in the search, change one or more of the values, find out why a particular occupation was not retrieved, or exit from LOCATE.

If students choose to exit from LOCATE, they go through a short "teaching" sequence that shows how LOCATE fits into the decision-making paradigm taught by SIGI and that also prepares them for entry into COMPARE. Novices then go directly to COMPARE or sign off and start with COMPARE when they return.

Initiates

Initiates go through the same routine as novices, except that they are given the option of bypassing the explanatory sequence and they do not see the teaching displays. When they leave LOCATE, initiates go to the menu display (figure 13), which allows them to enter any SIGI system or to sign off.

PRINTOUTS THE STUDENT MAY GET

Students may get a printout of the display listing the occupations retrieved by each set of values and specifications. (This display is reproduced in figure 10.) They cannot get printouts of value/specifications that result in empty lists or that retrieve too many occupations to be useful.

Students may also get a copy of the last display in the sequence explaining how the computer screens occupations to meet specifications (figure 11). This display summarizes the whole sequence.

Students may also get a copy of the display showing which specifications a selected occupation met and did not meet (figure 12).

THINGS FOR THE COUNSELOR TO LOOK FOR

LOCATE is much more subtle than it looks. The computer assembles the lists of occupations so fast that students may not grasp their special significance. Counselors should take special pains to find out how well students understand LOCATE.

The following paragraphs describe various features of LOCATE where understanding may be less than complete. You may discover other features that are not mentioned here because our experience with the revised form of the system is so limited.

1. The Student Does Not Understand the Special Characteristics of Occupations Retrieved in LOCATE

Any set of occupations retrieved has the common characteristic that it meets the value demands specified by the students. By implication, all the SIGI occupations NOT on the list--and their number is very large compared to the number retrieved--are less desirable with respect to these particular specifications. Therefore, if the specifications really represent what the students would like to find in an occupation, the list should obviously be of considerable importance to them.

Nevertheless, since the students do not actually go through the motions of screening the occupations themselves, they may not fully appreciate what the computer has done, in spite of the explanatory sequence that SIGI provides.

The display reproduced in figure 10 should always be viewed as a whole, the specifications AND occupations together. Students should be dissuaded from regarding their list as a tentative "Why don't you try this?" kind of suggestion made by some well-meaning person who has not known them very long. Students should get the feeling that they compiled their lists themselves.

2. Students Disregard Occupations because of Preconceptions or Prejudice

Some students dismiss occupations out of hand either because they have unfavorable preconceptions, they are misinformed, or they are totally in the dark about them. Students certainly should reject an occupation that fails to satisfy some important personal value. For example, Funeral Director is retrieved fairly often; it apparently satisfies many combinations of values and specifications. Only five values are used in retrieving this occupation, however, and students should not waste time exploring it if other values tell them that the work would be morbid or distasteful. On the other hand, you should warn them against impulsively rejecting such occupations out of ignorance or prejudice.

As with item 1, you should explain that occupations retrieved in LOCATE are a most distinguished group in terms of the students' own desires. The list may even include the potentially "best" occupation from the point of view of their values. You may warn students that they, "Like the base Indian, threw a pearl away richer than all his tribe."

There are three legitimate reasons for rejecting an occupation outright: (1) The specifications used in the retrieval process did not represent a students' real wishes. This might happen, for instance, if a student were merely experimenting at a terminal. (2) The occupation did not fit some value of importance that was not used in the retrieval process, as in the example of Funeral Director. (3) The occupation was beyond the reach of the student's abilities. Only values, not abilities, are considered in LOCATE.

You can urge students to use COMPARE in order to learn more about an occupation before deciding against it.

3. The Student May Be Dissatisfied because the Specifications Had to Be Manipulated in Order to Retrieve Occupations

If the students' values/specifications result in an empty list or too large a list, the computer forces them to alter their specifications until occupations are retrieved. If the alteration was required because too many occupations were retrieved, it is to the students' advantage: they can afford to be more demanding in what they specify. But if the students had to loosen their specifications because no occupations were retrieved, they may have been forced into finally specifying less than an acceptable minimum. For example, a student might have to lower the specification for Security from "A more than average amount" to "An average amount" in order to generate a list of occupations. If Security is important to the student, the resulting list may seem unsatisfactory.

In this situation, you can advise the student to reserve judgment on the occupations retrieved. Students should ask about them in COMPARE, exploring all their more important dimensions, before they decide the occupations are unsuitable. The purpose of LOCATE is not to guarantee eternal happiness in a career, but only to propose a set of occupations for the student to explore and ponder.

You may also suggest that students examine doubtful occupations in STRATEGY, where they can see how the occupations compare with one another when all ten values are taken into account. An occupation may have features that more than compensate for the deficiency in one value.

You may also want to go through LOCATE with the student. This will have to be done at the terminal, as described later, since there is no pencil and paper equivalent to LOCATE.

Finally, students may have to face the reality that no occupations in SIGI (or, perhaps, in existence) will fit certain combinations of values and specifications. For example, empty lists are likely to occur when the combinations include a small amount of education and high income, high prestige, or high leadership; the Aesthetic interest field and more than average security; or high income and more than average leisure.

In selecting such combinations, students are faced with a miserable fact that neither they, you, nor SIGI can do anything about.

4. The Student Is Discouraged Because Only "High Level" Occupations Are on the List

Occupations, especially professional ones, that require considerable education for entry, tend to rate higher on many values than do occupations that are easier to get into. They generally offer more income, prestige, independence, variety, and opportunities for leadership. The result is that occupations like civil engineer, industrial engineer, lawyer, physician, physical therapist, urban planner, and so forth appear on many lists unless steps have been taken to exclude them. Some students who doubt that they will be able to make it through a two-year terminal program are disturbed by what they regard as unrealistic suggestions by SIGI.

You can explain that the appearance of so many "high level" occupations reflects the structure of the work world. You should also show the students how to include Early Entry in their set of five values for the retrieval process. The specification for Early Entry allows students to set a limit on the amount of education required for entry into occupations on their list. This matter is discussed later in this chapter.

5. Failure To Explore

Some students retrieve one set of occupations in LOCATE and then exit at their first opportunity. Failure to use the system broadly is not necessarily bad. Some students use their first interaction in every system as an opportunity for learning how to use SIGI, and they do not interact much until they become initiates. Also, students seem to develop individual styles with regard to SIGI, some relying extensively on one system, some on another, depending on their expectations and needs. Therefore ignoring LOCATE may be only a stylistic quirk. On the other hand, if you suspect that students ignored the system because they did not understand it or recognize what it could do for them, you should try to shine a light into the darkness.

Indeed, it is in the juggling of values and specifications that students may learn a great deal about the compromise and barter one often goes through in career decision-making. A playful curiosity, a "what if" attitude, is to be encouraged here: "What if I lower this or that specification by a notch? How many more occupations will I snare, and how will they differ from my previous list? Or what if I increase my demands on a specification? Which occupations will I lose, if any? Or what if I substitute another value for one of these five?" In short, students should try to see how many useful lists of occupations they can generate, using as many permutations of values and specifications as they can tolerate. The lists compiled in LOCATE are suggestions for further explanation, not necessarily recommendations for final choice.

6. The Student Retrieved Occupations That Do Not Fit His Most Important Values

If students experiment with many different sets of values, they may eventually be retrieving occupations that ignore their highest weighted values without realizing that they are doing so. As a counselor, you should remind them never to look at any list of occupations apart from the values/specifications that generated it. Usually, it is to the students' advantage to begin their occupational search with the list generated by the values/specifications they like best. But other occupations should not be excluded. A number of occupations that were screened out on the first pass but come up as other values/specifications combinations are tried may turn out to be well worth further consideration.

You can also tell students that STRATEGY will allow them to compare occupations to see how they fit all ten of the SIGI values, not just the five used to get a list in LOCATE.

USE OF THE PRINTOUTS IN COUNSELING STUDENTS

When counseling students who have been on SIGI, you have to keep in mind that their first trip through is supposed to teach them how to use the system. Therefore, your treatment of novices will ordinarily be somewhat different from your treatment of initiates. In discussing SIGI with novices, you want to make sure that they have learned how to use the various systems and that they understand the printouts; you do not expect that they will have used any system extensively or that they will be far along toward a final career decision. The number and content of their displays may be irrelevant, provided that they have learned how to use SIGI for decision-making.

With initiates, however, you want to make sure of one thing more: Are they correctly using the content of the displays in reaching toward a career decision? In short, your discussion with novices stresses an understanding of the method; with initiates, understanding of the substance as well.

This caveat applies to all systems except VALUES. Both novices and initiates should try to weight their values correctly the first time.

Now let us see how you can use the printouts that students accepted in LOCATE, assuming that they have brought them to your office and are willing to show them to you.

Using the Values/Specifications/Occupations Display (Figure 10)

This display should be used to see if any of the conditions exist that were discussed in the previous section.

Case 1: Students present only one printout. If students retrieved only one set of occupations, find out first whether the students are novices or initiates. If they are novices, ask about the following points:

1. Ask how occupations on the list differ from other occupations in SIGI. If the answer is vague or wrong, you know that the students fail to

relate the occupations on the list to their own specifications of their values. They do not see the special significance of the occupations for them.

An analogy with a concrete situation may help get the point across. A person might go into a store to buy a pair of jeans. The person would surely have to specify the size wanted. The person might also specify the color as faded blue and the style as peg-leg. Now the shopper can be assured that any jeans retrieved by a competent salesperson will fit and will be the right color and style. These are therefore very special jeans in terms of what the shopper wanted. No other jeans in the store would be so satisfactory to THIS shopper, assuming that no mistake was made in the specifications. (But if the store doesn't have any jeans of the size, color, and style specified, the shopper may have to yield a little on one of these specifications. So the next set of specifications might change the color or the style or maybe even the size.)

Of course, it is a long way from a pair of jeans to a list of occupations. Nevertheless, you can focus the students' attention on the values/specifications side of figure 10. You can point out that in the case of both jeans and lists of occupations, these values/specifications result in a product with certain known qualities of great interest to the person shopping around.

2. Ask the students whether the specifications of the values in the printout are satisfactory. If they are, all the occupations on the list are worth serious study. If any specification is lower than desirable, however, urge the students to return to LOCATE and, using the same set of values, to try raising any specification that is too low. Novices should do this as soon as they become initiates, unless they have already reached a decision

about their careers. Initiates should refine their lists immediately, as explained in the next section.

It may be that the student had to lower the specification beyond an acceptable level in order to retrieve any occupations at all. (in that case, raising the specification will only result in an empty list.) This situation was discussed as item 3 of the previous section of this chapter. Novices should certainly reserve judgment until they get more information about the occupations on the list. Initiates will be faced with making trade-offs of one value in order to secure something more of another value. Urge students not to base their final choices on one item of bad news from LOCATE.

3. Make sure that all students understood how to change specifications for the values they selected, and also how to substitute values. They should not abandon LOCATE because they think they do not know how to work the system.

4. If any specification is at its lowest level, make sure that the students understand that the value so specified is not screening occupations. (There is no minimum level for Interest Field. For all other values the minimum can be recognized by the words in the printout, "All occupations fit this spec.") Students should raise the specification. If raising it causes an empty list, the students should substitute another value for the one with the minimum specification. (The only purpose in putting a specification at the losest level is to find out to what extent that value is restricting the list of occupations.)

You should also find out whether the value with the minimum specification is greatly cherished by the student. If it is, the student must understand that no occupation listed in the printout is satisfactory. Urge these students to return to the terminal and to try another set of values that includes the cherished one with an acceptable specification. Students may have to accept the fact, explained earlier, that no lawful occupations seem to meet certain combinations of values and specifications.

5. Although a list may appear satisfactory, ask the students whether they tried to refine it by seeing how high they could raise their specifications. A method for refining a list is explained later.

6. Ask the students whether the values named in the printout are the only important ones for them. Urge the students to return to LOCATE and try different combinations, comparing the occupations retrieved with each set. If the same occupation appears on many sets, it may come closest to meeting the students' desires.

With novices you should not emphasize the occupations on the list too much, since the novice may intend to return to LOCATE for more extensive use. Emphasize three things with novices: (1) the special nature of the occupations that fit desired specifications, (2) methods of changing values and specifications, and (3) the need to experiment in LOCATE with different values and levels of specification. If students are initiates, you need to explore the following points in addition to those you explored with novices:

7. Is their printout the only list of occupations they got in LOCATE? If it is, and if the students are still in the preliminary stages of career choice, they apparently have used LOCATE superficially. Encourage them to experiment with different sets of values and specifications. If their

printout already contains their most cherished values, tell them how to refine the list by raising specifications as high as they will go. Since initiates have reached the stage where they presumably are looking hard at occupations, they need to understand that LOCATE nominates likely candidates, and that they need to get nominees with several different values features.

8. Ask the students how they feel about each occupation listed in the printout. Look particularly for signs that students are rejecting occupations because of prejudice or preconception instead of some rational process. This matter was discussed in the previous section.

9. If all the occupations seem beyond the students' academic reach, ask the students how they feel about preparing for them. If the students are worried about the risks of shooting so high, you can explain how to use Early Entry to keep the lists within reasonable bounds as far as educational prerequisites are concerned. The method for using Early Entry this way is described later.

Case 2: Students have several lists with the same values but different specifications. Students may have more than one printout, each with the same set of values but with different specifications of one or more values. If only one specification is different, tell students to use the list with the higher specification, since that list is more "refined." (You will have to make an exception of this rule if the value is Early Entry. A higher specification for this value means that the retrieved occupations are less demanding in their educational requirements, and occupations may be excluded that able students ought to consider.)

If more than one specification differs, find out which specifications are most desirable to the students. Consider the following hypothetical situation:

A	B
High Income	High Income
More than $15,000	More than $11,000
Prestige	Prestige
An average amount	A more than average amount

The other three values/specifications are the same on both lists.

If some occupations appear on both lists, these are the most desirable with respect to this particular set of values, since they offer the higher income and the higher prestige. But if the two lists differ in all respects, students must decide which is more important to them, the higher income or the higher prestige. In any case, advise students not to base their decision solely on the information imparted by LOCATE. The best advice you can give them is to explore all occupations on both lists.

Case 3: Students have several lists with different values. There are no set procedures for treating this situation so as to determine the best occupations on all lists. If occupations appear on several lists, they are likely to be the most satisfactory, provided that the values and specifications are at least acceptable. You can ask the students to identify the values that are most important to them, and then see if any of the lists result from those values with specifications set at an acceptable level. You may also be able to work out a master list of values/specifications, with a selection of values from several lists, that the student can try out at a later session at the terminal.

Case 3 provides good material for getting across the point that occupations retrieved in LOCATE must be judged in light of the values/specifications that generated them.

The remarks about case 2 and case 3 apply to both novices and initiates.

Using the Printout Explaining How Occupations Are Screened (Figure 11)

If students bring up this display for discussion, it means that they did not understand SIGI's explanation of the screening process. In explaining the explanation, you should make three points clear:

1. The values/specifications on the left side of the explanatory printout are hypothetical. They are not the student's.

2. The numbers on the right side of the display are made up. The actual number of occupations in SIGI is not 175, and the number that would be retrieved by the values/specifications in the printout is therefore not 14. (Since the actual number of occupations in SIGI increases from time to time, 175 was chosen purely for illustrative purposes.)

3. The value Helping Others is set at the lowest level, and therefore it did not help in the screening process. Helping Others was presumably important to the imaginary student who chose the values. Yet he learned nothing whatsoever about the 14 occupations with respect to that value, for any occupation would meet the minimum specification.

If you try to explain the screening process, you can use the analogy of the shopper who was looking for faded blue jeans of a certain size in the peg-leg style. The shopper might first locate the counter with blue jeans. This step would be analogous to the computer's first screening, which netted 64 occupations that passed the test for Interest Field.

The shopper might now locate all the blue jeans of the right size--analogous to the second step of the screening process, in which survivors of the first test are screened for the income specification. Finally, the shopper would separate from the blue jeans of the correct size those that were faded blue, and would then separate from the survivors those in the peg-leg style. Out of all the garments in the store, only a few would fit all specifications.

Using the Printout Showing Why a Selected Occupation Failed to Be Retrieved (Figure 12)

Since this printout is not hard to interpret, students who want to discuss it are probably concerned about its significance with respect to their career plans. The most likely situation is that students were fishing for some favorite occupation and were upset to find that it does not meet the specifications they set down.

In counseling these students, try to find out why the flawed occupation was a favorite in the first place. Most students of the SIGI user age are very naive about occupations, and their preference, such as it is, is often based on irrational factors. You can point out that the information presented in the display is as accurate as possible. The students therefore have only two alternatives, either to give up the occupation or to accept less opportunity to satisfy the misfit value.

Students should not reject an occupation solely on the basis of the limited information they get from LOCATE. Tell them to explore the occupation more fully in COMPARE. Advise them particularly to ask about the important values dimensions of the occupation. The students may have to accept the fact that they actually did not know much about the occupation they were considering and that it was not worth going after.

HELPING STUDENTS USE LOCATE

There is no paper and pencil equivalent to LOCATE. If it seems advisable to discuss the system at a terminal, and one is free, you can sign on with any DEMO number not in use. Set status at 7 (initiate) in order to bypass the teaching displays and explanation of how the computer screens occupations. After sign on, the computer will display the menu (figure 13). Pressing number 3 takes you directly to LOCATE.

The computer supplies a dummy set of value weights for anyone using a DEMO number. Therefore advise students to disregard the weights as they appear on the screen, for they are not theirs. Tell the students to select the five values most important to THEM. (If the students are trying to reconstruct a set of values/specifications of particular concern to them, of course choose those values.)

When a list of occupations is displayed, you can discuss it in accordance with the particular problem of the student as described in the previous sections of this chapter. The following paragraphs cover special features of LOCATE that will help you in the discussion.

Too Many Occupations Retrieved

The computer displays no list if more than twenty occupations were retrieved. Students must tighten their specifications until a smaller list is generated. You should make sure that students understand what they are doing; the tightening process should never become a blind pressing of keys until occupations finally appear. You can ask the students which of the five values is most important to them and tell them to begin by raising the specification on that value. (Remember, however, that you do not raise the specification for Interest Field; you can only change fields, which may be of no advantage.) Students should keep asking themselves, "What do I want more of?" until they get a list of occupations.

No Occupations Retrieved

If no occupations are retrieved, the computer forces students to lower their specifications. This is a much more difficult situation to handle than its counterpart described in the previous paragraph.

You can look for combinations of specifications that do not fit the structure of occupations in this country at the present time. Such combinations may include a small amount of education and high income, high prestige, or high leadership; aesthetic interest field and high security; high income and high leisure. If any of these combinations exists, explain the conflict between what the students want and what is attainable.

In any case, sacrifices will have to be made. Students should begin by yielding on their least important value. Lowering the specification should not be mechanical or haphazard. For example, a student might lower the specification for Security and, finding that the list was still empty, then lower the specification for some other value. The student need not, and probably should not, keep lowering Security. Each decision to lower creates a new situation demanding a fresh decision.

(Again, remember that the specifications for Interest Field are not scaled and therefore cannot be raised or lowered.)

When a set of specifications finally retrieves a list of occupations, students should be told to look at the listed occupations in conjunction with the values/specifications. You should be alert for the conditions described in the next two paragraphs.

Occupations Retrieved, But Specifications Too Low

Forced to lower their specifications, students may have to reduce one or more below the level acceptable to them in order to retrieve occupations. You can advise students to replace one or two of their less important values with other values. The students can then reset to an acceptable level the specification that fell too low and search again with the new values/specifications. These changes should be done in the following order: (1) Get a printout of the occupations retrieved with the original values/specifications. (2) On the next display select option 3, to change one or more values. Values must be changed before specifications. (3) On the following display remove values to be replaced. These should be the values that are least important to the student. (4) Select the replacement value(s). (5) Put in specifications for the replacement value(s). The computer will now ask whether the specifications are satisfactory.

(6) Change the specifications that were reduced to an unsatisfactory level. This process should be repeated as often as necessary to arrive at a list that combines an acceptable set of values and specifications.

A Specification Was Reduced to Its Lowest Level

A specification at the lowest level does not screen, since all occupations meet or exceed that minimum. However, students may be forced to reduce a specification to that level in order to generate a list. If the value is important, follow the advice in the previous paragraph. Otherwise, you should advise students to substitute another value for the one whose specification is at the bottom step. Follow the procedures explained in the previous paragraph.

(NOTE: You cannot assume that all the occupations retrieved with a minimum specification have a minimum rating on the value so specified. If, for example, you lower Security to the lowest level and get a list of occupations immediately, you can be sure that all the occupations on the list are rated at the lowest level on Security. But if you reduce Security to the lowest level and do not retrieve occupations, and you then reduce another specification, getting a list, you cannot infer anything about the rating of those occupations on Security. See Appendix B for a discussion of this matter.)

Refining a List

If occupations were retrieved, the student should be encouraged to attempt refining it. The student might become more demanding in his specifications, insisting on more or greater opportunities than originally intended, and still succeed in getting a usable list. For example, a student may have included an average amount of Variety among his values/ specifications and succeeded in generating a list of occupations. Variety is important to the student. What will happen if the specification is raised?

What usually happens is that the list gets smaller. Occupations on the smaller list are purer, in terms of the students' own values, than those on the first list because of the tighter specifications.

In refining a list, students should begin by raising the specification of the value most important to them. If a list is still generated, they can continue raising the specification, or they can raise the specification for another value. Eventually they will get an empty list. Then they should lower the specification last raised and raise the specification for another value. At some point they will be unable to raise any specification without getting an empty list. They will then know that their latest list was as refined as it could get with the values that generated it.

Substituting Other Values

Students weighted ten values, but only five at a time are used in LOCATE to retrieve occupations. It is likely, therefore, that students have not used all the values for retrieval that are important to them. You should encourage students to experiment with different combinations of values.

Using Early Entry to Control the Educational Level of Occupations Retrieved

If students are consistently retrieving only occupations that require more education than they are willing or able to undertake, you should advise them to use Early Entry as one of the five values for their search. Replace the student's least important value with Early Entry. Set the specification at 3 (no more than two or three years beyond high school) or 4 (only one year or less), depending on the student's plans. No occupations will be retrieved that require a bachelor's or higher degree for entry.

Using Early Entry in this way may cause empty lists if other specifications are too high. It is apparently a fact of life that the more education, the better the opportunities to satisfy certain other values, especially High Income, Prestige, and Leadership.

Getting Printouts

You should tell students to request printouts of every new combination of values and specifications that retrieves. Extensive use of LOCATE will cause so many lists to appear that it would be hopeless to try to remember which values/specifications produced which occupations. Also, if students raised specifications to refine their list, they will need a record of the steps in the refinement process. Finally, it is obvious that not all lists are equally attractive in terms of the students' values. Some sets of values/specifications are more important than others. Since the printouts show both the values/specifications and the retrieved occupations, they allow students to associate the occupations with the proper values/specifications.

Using LOCATE for Information Retrieval

It is possible to go overboard in the use of LOCATE. Theoretically, one could use the procedures just described in order to find out how each of the SIGI occupations was rated on each of the ten values--in other words, to use LOCATE as a limited information retrieval system.

This is not the best use of LOCATE, which was designed to nominate a list of occupations for future inquiry. Although LOCATE should be used to refine the list of nominees as much as possible to make it conform to a student's wishes, the most convenient place to explore the occupations themselves is COMPARE, where students may ask directly for the information they are seeking. You should not forbid students to play with LOCATE, but you should also remind them that the real purpose of LOCATE is to present a list of occupations worth following up.

```
Values for locating               These occupations meet your specifications:
occupations:
                                     103 Air Cond, Refrig, & Heat Mech
                                     113 Broadcast Technician
                                     117 Business Machine Repair Tech.
(1) High Income                      122 Chemical Engineer
    More than $8,000                 123 Chemist
                                     124 Civil Engineer
                                     128 Dental Assistant
(2) Interest Field                   136 Electrical Engineer
    TECHNOLOGICAL                    149 Industrial Engineer
                                     151 Industrial Designer
                                     160 Mechanical Engineer
(3) Variety                          161 Meteorologist
    A more than average amount       174 Occupational Therapist
                                     185 Physical Therapist
                                     210 Telephone Craftsworker
(4) Security                         232 Firefighter
    An average amount


(5) Early Entry
    No more than 4 years
                                     Press PRINT (for a copy) or NEXT.
```

FIGURE 10

List of occupations retrieved and the values and specifications that retrieved them.

VALUE AND SPECIFICATION	OCCUPATIONS TESTED	OCCUPATIONS THAT FIT	OCCUPATIONS REJECTED
Interest Field TECHNOLOGICAL	175	64	111
High Income More than $11,000	64	39	136
Security A more than average amount	39	21	154
Helping Others Don't care. Less than average OK. (all occupations fit this spec.)	21	21	154
Early Entry No more than 4 years	21	14	161

Finally the computer tests the remaining 21 occupations to see how many require four years OR LESS education. It throws out the 7 occupations that require more than four years. The 14 survivors are the ones that are presented to the student because they meet or exceed ALL specifications on ALL five values.

For a copy, press PRINT; otherwise press NEXT.

FIGURE 11

Last display in the sequence that explains how the computer screens occupations with respect to a student's specifications.

Values for locating occupations:	126 Computer Programmer DOES NOT FIT means that your occupation does not offer the amount specified.
(1) High Income More than $8,000	Fit
(2) Interest Field TECHNOLOGICAL	Does not fit
(3) Variety A more than average amount	Does not fit
(4) Security An average amount	Fit
(5) Early Entry No more than 4 years	Fit

Press PRINT (for a copy) or NEXT.

FIGURE 12

Display showing in what respects an occupation (Computer Programmer) designated by the student failed to meet his specifications.

What do you want to do next?

(1) Sign off.

(2) Go to VALUES and examine your Values again.

(3) Go to LOCATE and look for occupations that fit your Values.

(4) Go to COMPARE and ask questions about occupations.

(5) Go to PREDICTION and get probabilities of success in key courses for various programs of study.

(6) Go to PLANNING and plan how to prepare for various occupations.

(7) Go to STRATEGY and see which occupations fit your Values best and also learn a method of choosing an occupation.

FIGURE 13

The "menu" that initiates go to when they sign on or when they complete any system. If SIGI lacks a prediction system, an alternative display appears naming PLANNING as option 5 and STRATEGY as option 6. By using a DEMO number a counselor can sign on as an initiate.

CHAPTER VI--COMPARE

More than any other system, COMPARE has a dual function. First, it obviously supplies occupational information that fleshes out the bare bones "go/no go" function of LOCATE. Second, less obviously, it is the third step in the decision-making sequence begun in VALUES and continued in LOCATE. As such, it has a definite logical relationship to those two systems.

Students seldom have problems with the first function. Sometimes, however, they fail to perceive the second.

Briefly, LOCATE proposes a set of occupations that are more likely than others to satisfy a student's values. It says, "Given your values, these are good places to look to satisfy them."

It is the student's task in COMPARE to examine these proposals and see which are worth pursuing and which can be eliminated. COMPARE says, "Given these occupations proposed by LOCATE and given all the occupational information available to you in COMPARE, which occupations do you want to consider further? Which look particularly attractive? Which do you want to rule out?"

WHAT THE STUDENT DOES

Novices

Students first see a "Reminder List," which consists of all the occupations that were retrieved for them in LOCATE. They must select three occupations for use in COMPARE, choosing either from the list, from the bank of all occupations in SIGI, or from a mixture of the two. When they have selected their three occupations, they see a table of 28 questions they may ask concerning the occupations (figure 14). They preselect up to five questions at a time, which are then answered one after the other. When all the preselected questions have been answered, students may return to the list of questions with their original three occupations, may assemble a new set of three occupations, or may exit from COMPARE. If they choose to exit, they see a short "teaching" sequence that recapitulates the steps they have learned so far in the decision-making paradigm. Novices then sign off or go directly to the Prediction system (if there is one at their college) or to the Planning system (if there is no Prediction system).

Initiates

The interaction of the initiate is exactly like that of the novice, with the following exceptions: (1) For the initiate, the "Reminder List" includes not only the occupations retrieved in LOCATE but also any other occupations that the student may have selected in COMPARE, PLANNING, or STRATEGY. For example, if students select for COMPARE an occupation that was not retrieved in LOCATE, that occupation is added to their "Reminder List." (2) The initiate does not go through the teaching sequence that the novice sees when he leaves COMPARE. (3) the initiate goes to the "menu" display when he leaves COMPARE.

PRINTOUTS THE STUDENT CAN GET

Students may get a printout of the response to any question they selected for COMPARE (figure 15). It includes a recapitulation of the question, the names of the three occupations involved, and the answer to the question for each of the three occupations.

THINGS FOR THE COUNSELOR TO LOOK FOR

General Considerations

Ideally, COMPARE continues the narrowing down process begun in LOCATE. This process should take place on two fronts. First, the list of occupations proposed by LOCATE will undoubtedly include some that students are not familiar with. Students should therefore get information about these unknowns to see whether they should include them in their list for further study. The best questions (with reference to figure 14) for this purpose are numbers 1 (Definition), 2 (Description of Work Activities), 5 (Formal Education), and any other questions of special interest to individual students.

Second, once a revised list of candidates has been compiled, students should explore them in depth. The questions most suitable for this purpose are those about the students' most important values, although they will certainly need information about other dimensions as well. In the display reproduced in figure 14, questions about values have been emphasized by the use of capital letters. A display that the student sees before encountering the list of questions encourages the student to select the values questions.

The following paragraphs carry on this discussion in more detail.

1. Nonselective Use of the "Reminder List"

The "Reminder List" is simply a collection of all the occupations that have come to the students' attention during their interaction with SIGI. It therefore includes occupations of varying degrees of attractiveness. Consequently, students should not ordinarily just go through the list from the top down. You can advise them to bring from LOCATE their hard copy printouts that contain the occupations retrieved with their most important values/specifications. These are the occupations that should be explored most extensively.

(NOTE: When the "Reminder List" swells to more than forty occupations, it is no longer displayed. It is probably too big to be useful when it reaches that size.)

2. Failure To Explore Occupations Nominated by LOCATE

Some students seem to start afresh in COMPARE as if nothing had happened in LOCATE. Instead of beginning their exploration with the occupations on the "Reminder List" that match their values/specifications, they select from unretrieved occupations.

This is reasonable behavior, especially for the initiate, considering the dual function of COMPARE. If, however, you suspect that the behavior is due to the students' failure to understand the special character of occupations retrieved in LOCATE, you should explain the relationship between LOCATE and COMPARE and their common dependence on the students' own values. The relationship was discussed above under the heading General considerations. See also chapter V, LOCATE, pages V4-V6.

3. The Student Fails to Ask about the Values Dimensions of Occupations

In the pilot study of SIGI, some students failed to ask questions related to their values, even their most heavily weighted ones. Their questions tended to concern "hard" areas, such as definition, beginning salary, physical surroundings, and so on. The values dimensions are obviously of great importance in the theory of guidance underlying SIGI.

In revising SIGI, we tried to draw students' attention to their values upon their entry into COMPARE. They review their value profile, get advice to ask questions about the values dimensions, and see the values questions featured in capital letters in the questions display.

Nevertheless, you should direct students to the values questions if the students do not seem informed about that aspect of occupations they are considering. You may have to review the whole decision-making procedure to get the point across, but the matter is fundamental and must not be neglected.

4. Inefficient Use of COMPARE

Questions are asked about three occupations at a time. After each request for information has been filled, students have the opportunity to replace one, two, or all three of the occupations with others. Many students replace only one occupation and then again ask questions they have asked before. This is logical if the students are engaged in comparative shopping, but it is wasteful if it is inadvertant, since they have already seen two-thirds of the answers. You can point out that a more efficient use of COMPARE is to replace all three occupations and to get printouts of all answers for comparison off line.

5. Skimpy Use of COMPARE

One might expect a person using COMPARE as a simple information source to dart into the system for a specific question or two and then to dart out again. But students obviously in need of considerable career counseling, who may be expected to use COMPARE as a logical follow-up of VALUES and LOCATE, should use it in greater depth. If you find that such students are woefully lacking information about occupations they are contemplating, you may have to go over the whole decision-making paradigm with them in order to give them some focus in their selection of questions. If you know which occupations they are thinking about, you can go over the list of questions (figure 14) to help them identify the ones that are important to ask. Explain that adequate information is essential to any intelligent decision.

Reluctance to seek information may also be symptomatic of an underlying emotional problem that will have to be cleared up before SIGI can be of much use.

Discovering These Problems

If students have taken printouts of every question they asked and if they bring the printouts to you, you will be in a good position to check on the points brought up in this section. You can see which questions they asked, how many, and about which occupations.

It is likely, however, that students did not request all possible printouts, and also likely they will not bring the printouts they did request. Consequently, you will have to infer from your conversations with students that such and such a problem does or does not exist. If students seem ill informed about occupations they are considering, you can assume that they did not make proper use of COMPARE. You can also ask direct questions to see whether students have explored occupations they retrieved in LOCATE and whether they recognize the importance of questions about values. But you may never find out whether or not they are using COMPARE effectively.

USE OF THE PRINTOUT IN COUNSELING STUDENTS

We will assume that you seldom have the satisfaction of seeing all the printouts that your students could have requested in COMPARE. Probably students will bring to your attention only those printouts that are of special concern to them. What are those concerns likely to be?

Incomplete Information

The amount of information that can be packed into one display is necessarily quite condensed. If students want more information about a question they asked, tell them to ask question number 4 ("Where to get more information?") and to write to the address that appears in the answering display. You may also refer them to the Occupational Outlook Handbook with the warning that information in that book may be up to four years old. Obviously, you will also want to use your own files of occupational information.

The Students Are Seeking Information About Local Conditions

Since the data in COMPARE are compiled from national sources, the answers do not always apply to local conditions. You should use your local knowledge if students are asking about local jobs, or refer the students to your local placement service. For example, students may complain that the salary figures quoted in SIGI do not agree with what they know is paid locally. You can point out that the SIGI figures are national and should be modified when more precise information is available.

Students Fail To Distinguish Between Jobs and Occupations

Students may not realize that the information in their printout aplies to occupations rather than jobs within an occupation. Data from job to job may vary within an occupation. Although COMPARE does recognize systematic variations, such as regional differences, or differences between jobs in industry, government, or education, etc., the occupational information in SIGI may not fit a particular job the student has in mind. You should help students discriminate between occupations, which subsume a great variety of different jobs, and the jobs themselves. If the students are interested in a specific job, warn them that the SIGI occupational information does not necessarily apply to every job in an occupation.

Counseling for choice of jobs requires a modification of some of the SIGI techniques. For instance, other values may be of great importance. Applying the SIGI paradigm to choice of jobs is discussed in chapter X.

Personal Concerns

SIGI of course makes no attempt to deal with the emotional problems that students may have in their career choice. Students may need help in evaluating the psychological implications of the printout. What does a certain salary mean with respect to their needs? What are their chances of completing all the steps to enter an occupation? Should a woman enter an occupation which has very few women? A printout may give rise to such questions as these, stimulating the students to seek or accept a counselor's help. Their concern may be with the affective more the cognitive impact of the data.

HELPING STUDENTS USE COMPARE

If it seems advisable to help students by signing on with them at a terminal, use a DEMO number. Set the status at 7 (initiate) in order to bypass the teaching displays.

The computer will insert a dummy set of occupations in the "Reminder List" for your DEMO number. Tell students to ignore the list and to select from the table of SIGI occupations the three they wish to explore. Also, tell students to ignore the value weights that the computer displays as a reminder to ask questions about values, since the weights are arbitrary too.

Students should be allowed to ask questions in any order they want. Some may begin with hard information about salaries, entry requirements, hours, work activities, and so on. Others may begin with the questions about personal satisfactions. In any case, make sure that students recognize the importance of the values aspects of occupations and ask about them before making any decisions.

How many questions should students ask about any set of occupations? It is impossible to suggest a formula. Students should understand that their main purpose is to gather information about the important aspects of the occupations in order to decide whether they want to eliminate them from consideration or to explore them further. Sometimes the answer to a single question will eliminate some contenders. The students should certainly ask enough questions to lead to rational decisions.

Suggest that students get printouts of all answers, and that they keep notes of occupations that look acceptable and unacceptable (SIGI does not do this for them). They should go through SIGI with various sets of three occupations until they have given a fair shake to all likely candidates. They can use their printouts off line to compare occupations that were not members of the same set for questioning.

DEFINITION AND DESCRIPTION
(1) Definition of occupation?
(2) Description of work activities?
(3) Level of skill in interacting with data, people, things?
(4) Where to get more information?

EDUCATION, TRAINING, OTHER REQUIREMENTS
*(5) Early Entry: Education required?
(6) Specific occupational training?
(7) Examples of college courses?
(8) Personal qualifications?
(9) Other requirements?

INCOME (National figures)
(10) Beginning salary?
(11) Average income? (Shows the midpoint of salaries nationwide)
(12) Top salary possibilities?
(13) How salaries vary?

PERSONAL SATISFACTIONS
(14) Help others: Chances to help?
(15) Leadership: Chances to lead?
(16) Interest Field: Which field?
(17) Prestige level?
(18) Special problems?

CONDITIONS OF WORK
(19) Physical surroundings?
(20) Leisure: hours, vacation?
(21) Independence on the job?
(22) Variety?
(23) Fringe benefits?

OPPORTUNITIES AND OUTLOOK
(24) National employment outlook?
(25) Where are the jobs (U.S.)?
(26) Security in the occupation?
(27) Advancement?
(28) How many women?

If you do not want to ask any more questions right now, press NEXT.
If you want to select another question, press its number and then NEXT.
If you make a mistake, press RUBOUT and start over.

FIGURE 14

Questions that students can ask in COMPARE. Students select three occupations for which they are seeking information. Then they may "program" the computer to answer up to five questions before returning to this list or selecting a new set of occupations. In this display, the student has already chosen the question marked with the asterisk and is about to choose another.

```
                              Employment outlook?
      160 Mechanical Engineer
Favorable, even though there is temporary unemployment due to cutbacks in aero-
space and defense.  Fewer mechanical engineers are being trained, and industry
is expanding in new areas, such as atomic energy and environmental control,
creating a demand that may be greater than the supply within a few years.


      113 Broadcast Technician
Slight increase in employment is expected but technical advances, such as
automatic switching and programming, will limit job opportunities.


      138 Electronics Technician
Good because of expansion of industry, increasing complexity of technology,
trend toward automation of industrial processes, and growth of new areas of
work, such as atomic energy.


      For a copy of this information, press PRINT; otherwise press NEXT.
```

FIGURE 15

Printout in response to question 24 (figure 14).

CHAPTER VII

PREDICTION

Your model of SIGI may not have a Prediction system. It takes at least a semester and sometimes two or three to collect the data that go into the regression equations, and during that time SIGI has nothing to predict. Moreover, a college may choose not to undertake the considerable effort of implementing a Prediction system.

In any case, when the predictive data are lacking, the computer is programmed to bypass the Prediction system. Novices would go directly from COMPARE to PLANNING, and the displays in PLANNING and STRATEGY that refer to the Prediction system would be replaced with alternative displays advising students to seek help from a counselor in assessing their academic prospects. The "menu" display for initiates (chapter IV, figure 13) is replaced by another in which PREDICTION is not listed as an option. In effect, SIGI runs as if the Prediction system did not exist.

Even if your model of SIGI lacks a Prediction system, it may be worth your while to read this chapter. You may have to take the place of the missing system, and you should understand what it attempts to do and how it meshes with the other parts of SIGI. Furthermore, the assessment of the probability of achieving a favorable outcome is an important step in the decision-making paradigm, and you should be able to tell your students how predictions contribute to making decisions rationally.

WHAT THE STUDENT DOES

Novices

Students are first warned against providing misleading information about themselves. They then state the amount of time they expect to set aside for homework, and they provide their best recollection of their rank in high school (which fifth of their class) and their high school (or most recent college) performance in mathematics and English. They also state whether or not they think they need help with English. Next, if the local college requires tests as part of its admission procedures, the students enter their scores on whatever tests the college uses.

The students now select the local curriculum or program (e.g., Electronics, Fire Science, Physics) for which they want a prediction. They are shown the name of a "key course" (a course essential to the curriculum and more or less representative of its subject matter) and are told that it is typical of the whole curriculum. They then rate themselves on four factors associated with success in the key course. (The factors are interest in the subject matter, commitment to the subject area, and two other factors, such as manual dexterity or writing ability, and so on, that instructors deem important for success in the course.) Finally, students see how course grades were distributed among previous students. On the basis of all this information, the SIGI students estimate their own grade in the course.

The computer calculates the probability that the students will get a grade of A or B, C, or below C. The regression equation is based on the best combination of predictor variables collected in the previous interaction. If test scores are available, they may be among the variables used. Otherwise, the probability calculations will be based on a set of variables that include one or more of the students' self-estimates. The probabilities are reported as "chances in 100" of getting the various grades (figure 16).

The students' first prediction is followed by a short interaction to make the point that the chances of getting a C or better are the sum of the chances of getting C and the chances of getting A or B.

Students are then allowed to select another program for prediction, to see answers to any of five questions about prediction, or to exit from the system. If they take the first option, interaction proceeds as before except, of course, that data about high school performance are not collected again.

If the students ask a question, they choose from the list shown in figure 17. All the answers are based on an analogy of what one can predict about the future performance of an archer from observation of her past performance.

If novices elect to exit from PREDICTION, they go directly to PLANNING or sign off and begin with PLANNING when they return.

Initiates

Initiates see the record of their past performance (high school rank, mathematics and English grades, and estimate of proficiency in

English) and either confirm or amend it. The rest of the interaction is almost exactly like that of the novice, except that initiates return to the "menu" display when they leave PREDICTION.

PRINTOUT THE STUDENT CAN GET

Every time a prediction is computed, students may get a printout showing what it was (figure 16). As many as ten predictions may appear on the chart. If students ask for more than ten in a single session, the prediction at the top of the list will be erased to make place for the newcomer.

THINGS FOR THE COUNSELOR TO LOOK FOR

PREDICTION was completely rewritten in light of what was learned in the pilot study of SIGI. We also asked future SIGI users about their policies with regard to tests. We then provided for informed self-estimates as an alternative to test scores for computing regressions, and we added the five questions that the students can ask (figure 17). We have no experience with either of these innovations. Therefore the following discussion is mostly conjecture founded on our experience with the old Prediction system.

1. The Student Does Not Understand a Concept Discussed in One of the Five Questions

Students may not understand SIGI's answer to a question, or, under pressure of time and fatigue, they may neglect to ask a question that they ought to ask. When you discuss the subject of prediction, students may betray their ignorance in many ways. For example, they may complain that their predictions are too low. This complaint is really question number 5 in other words: "SIGI and I disagree about the predictions. Is SIGI right or am I right?" Or they may say something like, "SIGI predicted that I would get a C," a statement that shows a lack of understanding in the area of question 3, "How can I predict what grade I will get in a course?"

If it turns out that these students did not ask the right questions when they were in PREDICTION, strongly suggest to them that they return to the system at their first opportunity and ask the questions. You can invite the students to return to you for further discussion after their interaction.

If the students have asked the questions but failed to understand the answers, you may need to go over the concepts again. The following paragraphs summarize the objectives of each of the answers by SIGI.

Question 1: What does "chances in 100" mean? SIGI avoids the word probability, partly because it is a long word and partly because the numerical expression of probabilities requires the use of decimals less than unity, which may be hard for some students to understand. Instead, SIGI expresses probabilities as chances in 100. If, after seeing the answer to question number 1, students still do not grasp the idea of probability, we can only speculate as to what has gone wrong. For some students you may have to start explaining from scratch. Other students may realize that 75 chances in 100 are better than 25, but may regard the probability statement in SIGI as the pronouncement of an infallible seer with an especially clear crystal ball. For these students you may have to explain what SIGI does, pointing out the difference between a probability statement and a true prediction. Students must understand that SIGI does not tell them what will happen--that is, the SIGI "prediction" is not really a prediction. It only tells them what the chances are that their grade will be such and such--that is, it is a probability statement based on the actual experiences of students "like" them.

Question 2: What are my chances of passing this course? Students who have seen their predictions may still wonder what the chances are that they will pass the course being predicted. Two possible misunderstandings may underlie this question. First, the student may not know what chances in 100 means. In that case, their question is really question number one in different words. On the other hand, students may not realize what the word passing means in operational terms. In most colleges D is a "passing" grade, but students are seldom happy with it. You may have to find out what the students' goals are before you can help them decide what constitutes a "passing" grade in the sense that it is adequate for their purpose. Generally, a B average is required for entry into graduate school, and B in one's major may be necessary or at least helpful in transferring. You can use your knowledge of local conditions, the policies of transfer institutions, and the requirements for entry into the students' selected occupation to help them see what grades will be expected of them. (NOTE: If you decide that C is the "passing" grade, the chances of getting at least a C are the chances of getting a

C plus the chances of getting A or B. See figure 16.)

Question 3: How can I predict what grade I will get in this course? Students who want to know what grade they will get have failed to understand the probabilistic nature of the expression chances in 100. Their question is really a variation of question number one, and you will have to explain the difference between a true prediction (which SIGI cannot give) and a probability statement. See the discussion for question one.

Question 4: How can I tell whether my chances are good or bad? Again, students asking whether their chances are good or bad may not understand the probabilistic nature of the expression chances in 100. They are really asking question number one. If, however, they know what chances in 100 means, they are asking for help in interpreting the SIGI probability statement.

The judgment as to whether a certain probability is "good" or "bad" is really a personal matter. In its answer to question 4, SIGI makes two points. First, chances that look bad to one person may look good to another, depending on their personalities and expectations. Second, in assessing chances, one must consider the magnitude of the reward for a favorable outcome or the penalty for an unfavorable one. For example, you would say that the chances in Russian roulette are invariably bad, for the reward for success is a trivial thrill, whereas the penalty for failure is death. In discussing rewards and penalties in education, you can point out that failure to get a hoped-for outcome seldom constitutes a total loss. A student may need a C and get a D, which, although inadequate for his purposes, still counts toward graduation. Even a failing grade probably carries with it some reward if something was learned. Therefore, even a low prediction may be perceived as "good" if the desired outcome makes defiance of the odds worth while and if there are some compensations for failure.

Question 5: SIGI and I disagree about the predictions. Is SIGI right or am I right? If the students disagree strongly with the SIGI predictions, you should look at the students closely to see if they are markedly different in some ways from the common run of your students. In computing the regressions, the computer selects only two or three variables from the total of 19 (12 if no tests are included) that potentially could be used. These variables include age and sex, as well as the information that students enter about themselves in PREDICTION. Students who are not typical of the population upon which the regressions are based may get false predictions. Therefore if students challenge the SIGI predictions, see if the students differ greatly in any of these ways from your average school population: they have been out of high school for a long time; they are graduates of a select secondary school where they ranked lower than they would have ranked in a public high school; they have matured because of work experience, parental responsibility, or unusual experience; they come from a foreign culture. You should advise atypical students to view SIGI's predictions with caution and to compare them with their actual grades as soon as possible to get a line on the predictions' accuracy. You may also want to help these students correct the information they entered about their high school rank, English grades, and math grades, as explained later.

On the other hand, if students' complaints about the SIGI predictions seem mainly emotional, you should explain the basis for the predictions. (The way the predictions are computed is discussed in item 5 of this section of this chapter.) Although the predictions may be imperfect, they are still likely to be better than any other information that students can get in advance of their actual grades.

Students are seldom dissatisfied if SIGI's predictions are better than they expected. Dissatisfaction arises when the predictions suggest that the students do not have many chances of getting what they want. It is hard to counsel such students without sounding discouraging, if not demoralizing. Somehow you have to get across the idea that the predictions should be taken seriously, but that they should not be the only factor that enters into a career decision. You can suggest that students adopt the risk/reward procedures proposed in STRATEGY, or that they risk a semester of a course for which the predictions are gloomy, or that they make contingency plans that will allow them to salvage something out of a program that turns out badly. For example, a would-be physician, architect, or engineer can fall back to a paraprofessional occupation without total loss of investment when it becomes apparent that the professional occupation is not going to work out.

2. Helping Students With Information About Past Performance

Students must enter certain information about their high school record: the fifth in which they were ranked, their average English grade, their average math grade, and their answer to the question, "Do you think you need help with English?" If their college requires tests, such as the Comparative Guidance and Placement battery, they also enter their test scores.

Students may have very inexact notions of their previous performance or may have forgotten their test scores. If you suspect that students have entered inaccurate information, review their high school transcripts and test records so that they can make corrections in SIGI. Data about past performance are usually good predictors of future performance, and so it is important that this class of information be as accurate as possible.

If some students are obviously atypical--older, more mature, from a different culture--you may want to try adjusting their actual record to make it more reflective of the students' true abilities. You should not, however, make any adjustments unless you have some objective basis for them. For example, if students have a recent grade in English that contradicts their ancient high school grades, the more recent information should be used. But do not change records by hunch or guesswork lest the entire basis for prediction be destroyed. It is better to leave the records alone and to warn students against putting too much weight on predictions than to try to intuit what their high school grades would have been under ideal conditions. After all, their predecessors, on whose experiences the equations are based, may have included students who were atypical in the same respects.

Every time students go into the Prediction system, they see the information they previously entered about their past performance. They are invited to correct it if it is wrong. Therefore you can tell qualified students to go to PREDICTION at their first opportunity and make the necessary corrections. While they are there, they should also ask for new predictions for any programs that might figure in their career decisions, since the new information might result in predictions that are different from the old ones.

3. Students' Actual Grades Differ from the Grade with the Highest Probability

Some students may say that the SIGI predictions are wrong or unreliable because the actual grade they received in a course was not the most probable grade according to a SIGI prediction. For example, they may have received a B, an outcome with only 10 chances in 100 instead of a C, an outcome with 70 chances in 100. Such students clearly do not understand the probabilistic nature of the prediction. You will have to go back to the beginning with them and explain what chances in 100 means. You can point out that their B grade signifies only that a less likely outcome occurred instead of the most likely one. But any outcome could have occurred. SIGI would have been proved wrong only if the less probable outcome had occurred for large numbers of students.

4. Students Perceive Their Predictions as Threatening

Predictions, like grades, may be perceived as threatening. If students appear anxious because of them, you can help them put predictions in the proper context. The probability statements represent reality. They reflect the actual distribution of grades obtained by previous students whose abilities or ratings were similar to those of the person seeking the prediction.

Unlike grades, they do not stand alone as a final stamp of approval or disapproval. Rather, they must be used in conjunction with other information. The places of use in SIGI are the Planning system, where students are told to consult PREDICTION to help them decide whether or not a curriculum lies within the range of their abilities;

and the Strategy system, where students are told to refer to PREDICTION when they assess their chances of successfully entering an occupation. Seen this way, as just one piece of information among the various pieces that go into decision-making, the predictions need not be so threatening. They give realistic information about "the odds." Students must decide for themselves whether "the odds" look good or bad.

5. Students Wonder How Their Self-Estimates Are Used

Students estimate the grade they will get in the course being predicted. The actual prediction computed by SIGI may show that they are more likely to get some other grade. Students may wonder what the point was of asking for their estimate, and may not know whether or how the estimate was used in computing their predictions.

To handle these concerns you need to know how the SIGI predictions are computed. How does SIGI use the information that students impart about themselves?

Figures 18 and 19 show what this information is. Notice that it is of two kinds, the fixed information (figure 18) that is independent of the course being predicted, and the variable information that students input for each course (figure 19). The latter consists of informed self-estimates--the students are given information about the content of the course and then rate themselves with respect to that content. They repeat this process with three other factors that are deemed relevant to success in the course. Finally, using all the information previously made available to them, they estimate their grade in the course.

Students previously enrolled in the course went through this same process long before the SIGI students ever got to the terminal. But the previous students differ from the SIGI users in that their grades in the course became known at the end of the term. Therefore it was possible to analyze their data to identify the variables shown in figures 18 and 19 that correlate (singly or in combination) with the actual grades. The best combination of two or three variables goes into the regression equation used by SIGI for that key course. If test scores are available, at least one of the variables must be a test score; if they are not available, one of the variables must be the student's estimated grade. All of the variables not used in the regression equation are ignored. No regression equation will be used unless it yields results that are statistically significant at least at the .05 level--that is, there are no more than 5 chances in 100 that the correlation between the predictor variables and the actual grade occurred by chance.

Therefore the answer to the students' concern is this: Their estimated grade is used exactly like any other predictor variable. If the experience of previous students shows that the estimate correlates well with the actual grade, it will carry considerable weight in the regression equation. If it does not correlate so well, it will carry less weight, and it may not be used at all if test scores are available. In any case, there is no guarantee that SIGI will report that the most probable grade is the one estimated by the student; other variables figure in SIGI's predictions too.

6. Students Do Not Know Which Program to Select for an Occupation They Have in Mind

The display showing the programs that can be predicted does not indicate how these programs may be related to occupations. Therefore a student who wanted to be, say, a broadcast technician might not know whether to ask about electronics technology or some curriculum concerned with broadcasting.

You can tell these students to go to PLANNING and select the occupation they are interested in, broadcast technician. During their interaction in PLANNING, they will get a list of the local programs that will prepare them for their occupation. They can then return to PREDICTION with their list.

USE OF THE PRINTOUT IN COUNSELING STUDENTS

The printout of the students' actual predictions (figure 16) is the best possible avenue for communication between you and them. Without it, any discussion of prediction is liable to be general and unsatisfactory, lapsing eventually into talk about the unfairness of tests and grades. Strongly urge students to bring their printouts with them for any discussion of prediction.

Selecting the Printout for Discussion

If students got several printouts in a single session, use the one that lists the most predictions. Every time a prediction is made, it is added to the end of the list. If the students get a printout of their third prediction, it will include the first and second predictions, and the printouts of those two will be redundant.

There is room for only ten predictions, however. If more than ten are sought, the latest prediction "bumps" the one at the top of the list, the remaining nine predictions are paged upward, and the new prediction is added at the bottom. Therefore, if students have several displays with ten predictions, put them in order in accordance with the way predictions moved up from printout to printout. The first predictions obtained in a session are likely to be the ones of primary interest, and you must be careful to find the printouts that include them.

If students bring printouts made in two different sessions at the terminal (that is, the students got a printout, signed off, later signed on again, returned to PREDICTION, and got another printout), you will have to examine both printouts. The students' predictions are destroyed at sign off, and consequently the printout from the later session will not carry forward any predictions made in a previous session.

Checking the Students' Understanding of Prediction

The printout is most helpful in checking the students' understanding of the concepts discussed in the previous section of this chapter, "Things for the Counselor to Look For." The points brought up there will usually come up naturally as the students talk about their predictions.

Use in Conjunction with the Planning System

In the Planning system, students are asked the direct question, "Do you think you have sufficient ability to prepare for such and such occupation?" They are then invited to use PREDICTION to confirm that estimate and are given the name of the program or programs to ask about. The printout with this information is reproduced in figure 21, Chapter VIII.

If students entered PREDICTION as a follow-up of PLANNING, see Chapter VIII--PLANNING, pages VIII-11--VIII-13. You will want to make sure, of course, that they understand their predictions, but they are really seeking help with their plans.

Use in Conjunction with the Strategy System

In the Strategy system, students are asked to estimate the probability that they could succeed in entering each of three occupations. Once again they are invited to use PREDICTION to confirm their estimates, and they are urged to return to PLANNING in order to get the name of the program to ask about with respect to each occupation. If they have gone through this tedious process, they will have three printouts like the one referred to above.

Students may be reluctant to go from STRATEGY to PLANNING to PREDICTION for a single piece of information. If it turns out that the students did enter PREDICTION as a follow-up of STRATEGY, see chapter IX, pages IX-19--IX-20. Along the way, make sure that your students understand the concepts underlying their predictions, but they are really seeking help in estimating the probabilities of completing a complicated sequence of steps.

Heterogeneous Collection of Predictions

The students' printouts may show what looks like a wild assortment of predictions, some from the arts, some from the sciences, some from the technological areas. They are so disparate that you have no sense that the students are groping toward some goal.

The students' behavior is not necessarily unsuitable, however. One of the advantages of having access to a private session with SIGI is that you can fool around and look at remote possibilities without penalty. As long as the students' ultimate decision is based on a rational process and adequate information, we suggest that they be allowed the greatest possible latitude on SIGI. The extravagant use of SIGI becomes undesirable only if students are blindly pushing keys with no idea at all of what they are doing.

HELPING STUDENTS USE PREDICTION

The interaction in PREDICTION is almost entirely linear and straightforward. The system does not have the subtleties of LOCATE, nor is it so closely related to the systems that precede it in the novice sequence. So far as we know, the only problems students will have with it are the conceptual ones discussed in the previous section. Therefore sitting with students at the terminal probably cannot add much to what you can accomplish by talking with them in your office.

Nevertheless, if you do want to go on the system with a student, use a DEMO number. Set the status at 4 so that you will enter PREDICTION as a novice. If your college requires tests, take the student's scores with you. (If you do not enter test scores, SIGI will still make predictions. They will be based on the self-estimates, and may differ slightly from predictions based on test scores. We do not yet have sufficient data to know which predictions are better correlated with grades.) Also, enter the most accurate information you can with regard to high school rank, English, and math grades--the fixed information illustrated in figure 18. If these data are different from what the student entered himself under his own number, make a record of the correct information and tell the student to go to PREDICTION with his own number at his first opportunity to correct his record.

The estimates that students make with respect to each course (interest in subject, commitment, etc.--the variable information illustrated in figure 19) are not retained between sessions. Therefore any misinformation students may have entered about these variables will be wiped out when they sign off. At the present time there is no way to make corrections in the entries of test scores. If the students have entered erroneous scores, the only way to correct them will be to start SIGI from the beginning with a new student number.

SUBSTITUTING FOR THE PREDICTION SYSTEM

If your version of SIGI does not have a Prediction system, alternative displays advise students to see their counselors for help in those situations usually treated by the Prediction system. In effect, you will have to substitute for the system.

Unless your college has done research studies of the sort that leads to the regression equations stored in the computer for calculating SIGI predictions, you cannot give precise "chances in 100" statements about your students' prospects in a key course or a curriculum. Nevertheless, the information you have about your counselees, combined with your knowledge of local curricula and how easy or tough they are, can be of inestimable help to your students.

In SIGI, predictions are most valuable when they are used in conjunction with the Planning and Strategy systems. In the Planning system students need some idea of what the odds are if they embark on a given program. Even though you cannot state the odds in mathematical terms, you can say something useful about the difficulties of the program and the characteristics of the students who succeed in it.

The second decision point where you can render assistance is in STRATEGY. In that system students must state what they think the odds are that they will succeed in entering a given occupation. This is obviously a much more difficult estimate to make; many different steps are involved, each with its own odds.

Although making a reasonable estimate may seem an impossible task, remember that the purpose of the estimate is not to arrive at an exact mathematical statement of probability. The purpose is to impose some sort of "reality factor" on the choice of occupation. One can seldom make choices on the basis of attractiveness alone. Some occupations are much harder to get into than others, and the degree of difficulty has to be taken into account. Your general experience, together with your inside knowledge of the academic obstacles in the path to entry, make you much better qualified than most students to judge the realities of their options. Therefore even your guesses may counterbalance their unbridled optimism or bleak pessimism about their chances.

Chapter IX, pages IX-17--IX-19, offer suggestions for making the estimates.

```
                                                   Chances in 100 for a grade of:
          Program: Key course                      A  to B       C       Below C
Engineering Science: Math 111 Math Analysis I         5          90          5
Computer Operations: CO 103 Computer Ops. I               ACTUAL GRADE:  B
Civil Engr. Tech.: MA 105 Algebra & Trig.            60          30         10
Radiologic Tech.: RT 100 Radiologic Tech. I          50          40         10




For a copy of the prediction(s), press PRINT.  Otherwise, press NEXT.
```

FIGURE 16

Prediction report. New predictions are added to the end of the list until ten have been computed. If the student asks for more than ten, the first is erased and the list is "paged" up to make room for the newcomer. Enrolled students are asked if they have already taken the course to be predicted. If the answer is yes, the students enter their actual grade instead of getting a prediction. Predictions are not stored between sessions.

```
Press the number (1-5) of the question you want to ask.

(1) What does "chances in 100" mean?
(2) What are my chances of passing this course?
(3) How can I predict what grade I will get in this course?
(4) How can I tell whether my chances are good or bad?
(5) SIGI and I disagree about the predictions.  Is SIGI right or am I right?
```

FIGURE 17

List of questions the student may ask about the prediction process. After a new prediction has been displayed, students are given the option of requesting another prediction, asking a question, or exiting from the Prediction system. The students' predictions remain on the screen during the interaction that develops the answers.

1. Age
2. Sex
3. High school rank
4. High school English
5. High school math grades
6. English proficiency
7. Hours homework per week

8-14. Test scores

FIGURE 18

Potential predictor variables that are the same for all courses for which grades can be predicted. If a college does not use tests, variables 8-14 would not be used. If a college does require tests, up to seven different test scores may be entered, and at least one would be a factor in each regression equation.

1. Interest in subject
2. Commitment to subject area
3. Third factor
4. Fourth factor
5. Estimated grade

FIGURE 19

Potential predictor variables that differ from course to course. For factors 1-4, students rate themselves. Factors 3 and 4 are selected by instructors in the course, and may concern such matters as reading ability, writing ability, regular attendance, manual dexterity, and so forth, depending on the content of the course. Factor 5 is the students' estimate of their grade.

CHAPTER VIII

PLANNING

An important class of information that goes into a decision is the plans for implementing it. This information is useful both before and after the decision is taken. It is wise to know what will be required in the way of time, energy, and expenditure for each of the options under consideration before you make up your mind about any one of them. And after you have decided, you need some sort of plan, a road map, charting the route to your goal.

This is the class of information provided by the Planning system. Like COMPARE, the Planning system offers occupational information. But unlike COMPARE, the information is not concerned with the nature of the occupation itself but with the requirements for preparing for it, beginning with graduation from high school.

WHAT THE STUDENT DOES

The amount of local information that your college has put into the computer will affect what the student does in the Planning system. If your college has not yet entered all the necessary information about the programs of study and transfer institutions it recommends for each occupation, the interaction will terminate much earlier than if that information exists, and the counselor will have to make up what the computer lacks. Also, references to the Prediction system will not appear if your college does not have that system. Again, the counselor may have to supply the missing element.

Therefore, as you read the following description of what the student does in PLANNING, skip any _if_-clauses that do not apply to your college.

Novices

Students see the "Reminder List" of occupations that have come to their attention in systems previously encountered--that is, the occupations that were retrieved in LOCATE or selected for query in COMPARE. The students select an occupation for PLANNING, from the list or not. They then see the amount of education beyond high school they would have to take in order to prepare for their occupation and are asked if they are willing to make this investment. If they say no, novices see a display that tells them to continue through PLANNING with their selected occupation in order to learn how the system works, and they continue just as if they had said yes. They are next asked if they think they can cope with the courses they would have to take in preparing for the occupation, and they see the names of representative courses. Regardless of their response, they go on to a display telling them how to confirm their estimate. If your college has a Prediction system, they are told that SIGI will tell them what curriculum to enroll in at their college, and that they should use PREDICTION to get a line on how well they are likely to do in it. If your college has no Prediction system, they are told to seek a counselor's advice if they are uncertain about their ability.

The students may now elect to see two displays pointing out the rewards and risks of enrolling in a curriculum that may prove too tough as opposed to trying another occupation easier to prepare for. Since novices are denied the opportunity to switch to a different occupation until they have seen the entire Planning system at least once, they then must go on to an overview display explaining all the steps they would have to take to enter their occupation.

If your college has not yet completed its Planning system, the interaction ends with a few displays telling the students to see a counselor for help in selecting the best curriculum for their occupation and for enrolling in it, if that is what they want to do.

If your college has a complete Planning system, the interaction continues with a series of displays which differ from college to college depending on what curricula they recommend as preparation for various occupations. The first display names the local curriculum the students should enroll in as the first step toward their occupation. If more than one curriculum is suitable, all the options are named, and students choose the one they are interested in. They then see the prerequisites (required or recommended) for entry into that curriculum. Next they see the actual course listings for a local junior college program recommended by their college. If the preparation requires transfer to another institution, they see a list of colleges in their area where they can complete the preparation. Also, students who are already attending college or have previously done so see a display suggesting how they can reconcile the recommended program with courses they have already received credit for.

At this point students are asked if they are still interested in pursuing the program they have seen. If not, they may exit from PLANNING, select a different occupation and see plans for it, or (if more than one curriculum prepares for their occupation) see an alternative program for their selected occupation. If they are interested in pursuing the program, they are first asked whether they have completed the prerequisites and are advised to see a counselor if they are not sure. They may also see a sequence of displays showing the sources of financial aid for education that are available. Finally, they are told what to do and whom to see about enrolling. Students may then exit, plan for a different occupation, or see alternative plans (if any) for their present occupation. In any further interaction in PLANNING, the novice is treated as an initiate.

Initiates

Initiates follow the same path as novices, with the following exceptions: (1) Instead of having to select an occupation, the initiate may choose General Studies, which is defined as the program for students who are not considering a specific occupation. (2) Initiates are not forced to go through all the steps of the Planning system as a learning experience. They may abandon an occupation without seeing plans for it if they decide that the preparation takes too long or if the coursework looks too difficult.

PRINTOUTS THE STUDENT MAY GET

Students may get a printout of the overview display showing the steps they should take to enter their occupation (figure 20). This display exists independently of whether or not your college has entered its own Planning system. Taking a printout is optional, and all students may get it who have not rejected the occupation they first selected.

If your college has a complete local Planning system, students must get printouts of all the following displays except number 7:

1. The name of the local curriculum or curricula that your college recommends as the first step in preparation for entry into the selected occupation (figure 21). (NOTE: This display appears only if your SIGI has a Prediction system.) The purpose of the display is to tell students how to use the Prediction system to find out if they were on the mark in estimating their ability to handle the coursework. The wording of the display varies depending on whether more than one curriculum is recommended and whether preparation involves graduate training.

NOTE: This display and the occupational overview (figure 20) are both used in STRATEGY as well as PLANNING. If students show you these displays for discussion, find out which system they want to talk about.

2. Prerequisites for admission into the recommended curriculum (figure 22).

3. The program course listings for that curriculum as recommended for their occupation (figure 23).

4. Recommended transfer institutions, if their occupation requires transfer (figure 24).

5. If your college does not offer an appropriate curriculum for the occupation, a list of nearby institutions that do offer one (figure 25).

6. For students already attending college or previously enrolled, the display telling them how to reconcile old and new programs (figure 26).

7. Any or all of the five displays showing the sources of financial aid (no figure).

THINGS FOR THE COUNSELOR TO LOOK FOR

The Planning system really serves a double function. First, it provides information which, like the information from COMPARE and PREDICTION, serves as a basis for decision. Second, once the decision has been made, PLANNING provides a blueprint for implementing it. Your role will be different with respect to these two functions.

PLANNING As a Source of Information

What am I committing myself to if I make this decision? The answer to such a question is a legitimate piece of information contributing to the ultimate decision. There is no sense in deciding to do something that is impossible or unacceptably difficult. The Planning system provides the necessary information.

Upon completing the Planning system, students will have three classes of information which are inputs into the informational pot. The first is the occupational information they got in COMPARE--the "hard" information about the physical dimensions of occupations, and the softer information about the values dimensions. Second, in PREDICTION they got information about the likelihood of their making it through the preliminary coursework that prepares them for the occupations. Now in PLANNING they get information about the activities they will have to undertake in order to get into the occupations. Their next step is to integrate these three classes of information into a decision. The Strategy system provides a basis for this kind of integration.

PLANNING As a Blueprint

Once students have decided on a career, the PLANNING information ceases to be input for the decision and becomes instead the blueprint for implementing the decision. It tells them what steps to take to enter the occupation, beginning with their enrollment as freshmen in junior college.

Role of the Counselor With Respect to PLANNING

Your role as a counselor naturally varies depending on whether the students are using the Planning system as input for their career decision or as the blueprint for their career plans. If the latter, your role involves working out a schedule that will mesh the students' present status with the ideal program represented by the program of study display (figure 23). You have to get them qualified with regard to prerequisites and courses they have already taken, get them pointed toward a transfer institution if that is part of the preparation, help them with financial aid, make sure they understand the obstacles down the road (licensing exams, graduate study, applications for transfer, and so on), and get them registered.

If your students have not made a career decision, the PLANNING information is just additional input for the decision itself. Now your function is to help students integrate the information about plans with the mass of information they have got in other systems, particularly COMPARE.

Role of STRATEGY. If students have not been through STRATEGY, you should defer any decision until they have completed that system. STRATEGY sets forth a method for integrating several kinds of information and for arriving at a decision based on the rewards and risks involved if it is made.

If students have been through STRATEGY and still wish to discuss the information they got in PLANNING, you should help them evaluate it in relation to the occupational information they got in COMPARE and the predictive information they got in PREDICTION.

Completeness of Information. The first thing you should now look for is complete information about the occupations under consideration. The decision should not be based on information from only one source. If students appear to be basing their decision on what they learned in PLANNING without regard to information from COMPARE and PREDICTION, you should urge them to return to those systems and get a complete dossier on the occupations. (You should take comparable action if they appear to be basing their decision only on what they learned in COMPARE or only on what they learned in PREDICTION.) Information from a single system might well be sufficient reason for rejecting an occupation out of hand, but it is only necessary (rather than sufficient) information for accepting one. For example, students would be justified in rejecting the career of pharmacist because it is too hard to prepare for, but they should not accept it simply because they are good at chemistry and biology and think they can make it through graduate school.

Therefore your first role in helping students integrate all the informational inputs that go into their decision is to see that students have the information they need and that they are not putting too much weight on one class of information (say a favorable prediction or feasible plans for entry) at the expense of the others. It is especially important for students to consider the value dimensions of the occupational candidates, and you may have to send them back to COMPARE to ask the values questions.

USE OF THE PRINTOUTS IN COUNSELING STUDENTS

Occupational Overview (Figure 20)

This display appears in STRATEGY as well as PLANNING. You should therefore ask students who wish to discuss it whether or not they have gone through STRATEGY. If they have not, suggest that they do so before discussing the overview. Some of their questions or misgivings may be answered in that system. Also, if students have overview displays for several occupations and are wondering which to choose, suggest that they go through STRATEGY before making a commitment. They can always return to PLANNING later.

If the students are interested in the overview in connection with only one occupation, you can point out that the display encourages them to look at the whole process of entering the occupation, not just the first step of enrolling at your college. The overview is a kind of road map showing the route to their occupational destination. They should be aware that in selecting an occupation, they are committing themselves to a certain sequence of steps, and that they should be thinking about the more distant step as well as the beginning ones. For example, if they will have to pass some kind of certification examination or get accepted into graduate school, they need to bear in mind that their success in completing those steps depends to some extent on their success in the preliminary coursework.

If many steps are involved, students may become discouraged at the prospect. They sometimes rebel at the "irrelevance" of distribution requirements and courses remote from their occupational interests. You can use the overview printout to put the courses in perspective. If preparation for the occupation is seen in its entirety, the courses fall into place. Completing them makes the succeeding steps possible.

Incomplete Planning system. If your model of SIGI does not have a complete Planning system, you may have to use the occupational overview as the basis for suggesting the best curriculum to enroll in. In effect, you will have to take on the burden of the portion of the Planning system that does not yet exist at your college. Follow your standard academic advisement procedures, using the occupational information contained in the overview to help you select the best program for the students' career goals.

List of Suitable Curricula (Figure 21)

(The curricula display is not shown if your version of SIGI does not have a Prediction system or if it lacks local information for the Planning system.) As part of the PLANNING interaction, students are asked if they have ability to cope with the educational requirements for the occupation they selected, and they see a sample of the names of typical courses in a preparatory curriculum. Regardless of their estimate, they are told that they will get a list of the local curricula that provide suitable preparation. They can then take the list to the Prediction system and ask about a listed curriculum to see whether their estimate was realistic or not. This display completes the promise. If their chances of getting C or better (B or better if they will have to take graduate training) look satisfactory, they would presumably gain confidence that their selection of occupation is on the right track.

If students show you this display, the first thing to do is find out if they actually did use the Prediction system to check their estimate of their ability.

You should be prepared for some problems. First, a prediction may not be available for the curriculum the student wants or must take. The course being predicted may be new, or a college may take several years to accumulate enough data to make a valid prediction possible. In that case, you will have to use your experience as a counselor to give students some realistic notion of whether or not they would be getting in over their heads.

Second, novices may not know how to go to the Prediction system. If they come to you before they have entered STRATEGY, they will know only that they have to start in STRATEGY, not PREDICTION, at their next sign on. Tell them they may go to any system in any order as soon as they have finished STRATEGY.

Third, some students may be reluctant to go to the Prediction system for various reasons. If they encountered it only as novices, you can tell them that it is much easier for an initiate to use the system than it is for a novice. Initiates can bypass the explanatory sequences and take a direct path to the predictions they are seeking.

Students should be strongly encouraged to use the Prediction system to evaluate the estimates they have made in other systems (PLANNING and STRATEGY). They need to realize that all available information should go into a decision as important as choosing an occupation. Moreover, they should understand that no SIGI system is completely self-sufficient. Each handles a different class of information, but all contribute to the decision. It may give students a feeling of confidence to control SIGI, moving from system to system with some idea of what they are doing.

NOTE: The list of curricula display is also used in STRATEGY, again with the advice to go to PREDICTION to evaluate an estimate. In STRATEGY, however, the estimate is not merely the probability of coping with an educational program, but the probability of successfully completing all the steps for entry into the occupation. See chapter IX, STRATEGY.

Prerequisites for Admission Into a Curriculum (Figure 22)

(This display will not appear if your version of SIGI lacks local information for the Planning system. Also, the wording of the display may vary from that in the figure, depending on the policies at your college. The wording in the figure is for a college where prerequisites are mandatory. If they are merely advisory at your college, the wording will say so. The display is prepared by your own college and goes with the program of study display that follows it.)

The prerequisites display has two functions. First, at colleges where prerequisites are mandatory, the display helps keep students out of curricula for which they are not qualified. Second, it helps students make judgments about undertaking a program, with the secondary effect of sometimes starting them toward another occupation.

The students may want to discuss with you their status with respect to the prerequisites. Much of what you say will depend on the policies of your college and the ability of the students. This whole matter is purely a counselor function and is beyond the scope of SIGI. SIGI makes no attempt to diagnose deficiencies or recommend remedial courses.

Program of Study (Figure 23)

(This display will not appear if your version of SIGI lacks local information for the Planning system.)

The program of study display was prepared by your own college. Since different colleges format the displays in different ways, and since they use different names and numbering systems for their curricula, the displays your students get may not look exactly like the reproduction in figure 23. Whatever the format, you should be able to count on the accuracy of the display's content: The program represents the informed judgment of experienced counselors as to the best preparation at your college for entry into the occupation. Therefore you should not have to worry about whether or not the courses are right for the student's occupational goal or whether the program will transfer if transfer is necessary. Presumably, these matters were disposed of when the program display was prepared.

Discussing programs for different occupations. Some students go through PLANNING several times. They consequently may come to you with programs for several different occupations that they want to discuss.

You should direct the students' attention to choice of occupation rather than to choice of program. The program is only a means to an end; once the end has been chosen, it largely determines the selection of program. The students' task is to combine the information contained in the program display with the information obtained from COMPARE and PREDICTION in order to reach a career decision. You may have to suggest that students use COMPARE to get more information about these occupations, and that they use STRATEGY to size them up with respect to their desirability and feasibility.

You will probably also want to go over the programs themselves to make sure that your counselees understand their implications with regard to choice of career. Compare the programs as to the amount of time required to complete them, prerequisites for admission into the programs, and scholastic demands. The occupational overview previously displayed will show whether the program completes preparation for the occupation or is only the first step in extended training. The prerequisites display will show what is required or recommended for admission into the program. And the Prediction system is available to help students in making judgments about ability to cope with the scholastic demands.

All these matters were brought to the students' attention in their interaction with SIGI before they got printouts of the program displays. Therefore students who are concentrating on programs without regard to occupations may have failed to integrate the various steps of decision-making. You may find that they need help in understanding the whole process rather than in evaluating the programs.

Discussing alternative programs for a single occupation. If more than one curriculum prepares for the occupation, they are listed and the students choose the one they want. When they have seen the displays for that curriculum, they may then see the displays for an alternative curriculum before trying out a new occupation. Therefore students may appear with several programs for the same occupation and may want to discuss the alternatives.

In many cases the programs are equivalent and the choice can be based on the convenience of the students. An example is the occupation airline pilot. Entry into the occupation really depends on getting accepted into a flight training program in one of the Armed Services. (It is almost prohibitively expensive to accumulate enough jet flight time in private training.) A bachelor's degree in any field is required for acceptance. Since the field makes no difference, students can choose a curriculum that suits their tastes, their qualifications for admission, the transferability of courses they may already have taken, or their desire to prepare for an alternative occupation in the event their original plan does not work out.

In other cases the selection of curriculum makes a difference. For example, some colleges recommend alternative transfer and nontransfer curricula for those occupations for which a bachelor's degree is recommended but not mandatory. It is usually advantageous to have a bachelor's degree. Although many older members of an occupation may not hold four-year degrees, employers tend to favor applicants who do hold one. Thus, as older members retire, the mean educational level for the occupation goes up, and eventually the two-year degree will no longer be sufficient qualification for entry. Of course, not all occupations are subject to this trend, and conditions vary from locality to locality. But when students are torn between the two- and four-year paths into an occupation, you can use your knowledge of local conditions and national trends to explain the issue to them.

For some occupations with more than one path to entry, the curricula represent different occupational goals. For example, a would-be science librarian should take a science curriculum before taking the postgraduate librarianship program. General librarians should take a liberal arts curriculum. In these cases find out what the students' occupational goals are and advise the students to take the curricula that lead to those goals.

Enrolling the student in the program. The program in the display represents what an entering freshman free of academic deficiencies should take to prepare for the selected occupation. If your counselees fit this definition, you can enroll them in the program just as it is displayed. If they lack some prerequisites, however, or if they already have credits from some other program, you will have to plan their college work so that it will mesh with the recommended program.

In trying to meet the needs of individual students, you have to be careful not to distort the program as displayed in some way that harms its utility. The persons preparing the program followed the policy of designating specific courses only if they directly prepared one for the occupation, were a prerequisite for transfer, or were otherwise definitely advantageous. They left the students as many electives as they could. Therefore you must be cautious about replacing a course named in the program display with some other course that superficially seems equivalent. If a student has already taken a high level math course, it is probably safe to substitute it for some lower level math course named in the display. But it is not safe to assume that a sociology course could be substituted for a psychology course named in the display, even though they both fulfill a distribution requirement. As long as the aim is to register the students in courses that will prepare them for their chosen occupation, the recommended program of study should be closely adhered to.

General Studies program. Students may appear with the program of study display for General Studies. General Studies differs from college to college. Some colleges limit it to a one-year exploratory program for students who are not prepared to declare a major. Other colleges have no set curriculum at all. In SIGI students can call for General Studies when they want to enroll in college but have no occupation in mind. Therefore the General Studies program display is the only one not geared to an occupation. Consequently, when you enroll a student in General Studies, follow the policies of your college without worrying about the student's occupation.

Recommended Transfer Institutions Display (Figure 24)

(This display will not appear if your version of SIGI lacks local information for the Planning system.)

This display was prepared by your local college. It lists the institutions in your region that students commonly transfer to in order to complete the occupational preparation begun in your college. If preparation for the occupation can be completed at your college, there will of course be no display of transfer institutions.

The institutions listed in the display were identified after varying amounts of investigation by members of your college staff. You can have confidence that the institutions really do offer programs that allow students to complete preparations for the occupation they want. If one of the institutions is agreeable to your students, you can point them in that direction.

The list is incomplete in two respects. First, it makes no attempt to identify all institutions that have adequate programs. Second, it is regional. Therefore, if students are interested in other regional institutions or if they want to transfer out of the local region, they may need guidance.

Identifying transfer institutions not listed. You can refer students to The College Blue Book: Degrees Offered by Colleges and Subjects, Volume 3 of The College Blue Book (New York: CCM Information Corporation) to locate out-of-region institutions with satisfactory curricula. To use the volume, look up the major field that prepares for the occupation. You will then find, listed state by state, all the colleges that teach the major, as well as the degrees they offer.

You have to use the Blue Book with some care. First, the same major field may go under a variety of names. For example, Transportation, Traffic Management, Traffic and Transportation Management, and Business Logistics might all be different names for the same body of courses. Second, a college named as offering a curriculum in a field may actually offer only a smattering of courses. For example, a college listed as offering a major in statistics or technical writing may turn out to have a few courses attached to majors in other fields. The individual courses are useful in preparing for an occupation, but a would-be statistician, say, who has taken a few statistics courses as part of a math major is at a disadvantage in competing with someone who has taken a full-fledged statistics curriculum. Therefore use college catalogs to confirm that an institution listed in the Blue Book really does offer a complete major.

Checking the transfer college. You should encourage students to examine the catalogs of colleges they may transfer to. SIGI attempts to make students responsible for their own decisions, and they should not become too dependent on either you or SIGI for perfect information. They should check college catalogs, first, to see if the colleges offer a major that really prepares them for their occupation, and, second, to see that their junior college program will transfer smoothly. Encourage them to communicate directly with any transfer institution they are thinking about.

Referrals to Other Junior Colleges (Figure 25)

(This display will not appear if your version of SIGI lacks local information for the Planning system.)

Like the program display, this display was prepared by qualified persons at your college. It represents their judgment that students would be better served by going elsewhere to prepare for the occupation designated in the display. Therefore, if students are interested in the occupation, the best thing for you to do as a counselor is help them enroll in one of the institutions specified in the display. Ordinarily, this will be another junior college in another county, but it may be a parietal school or college. Do not make up a special program for these students out of a pastiche of courses at your college. Very often the occupation involves special licensing problems that a makeshift program cannot meet.

If your state has a "chargeback" law that allows students under certain circumstances to enroll in a public junior college in another county without being liable for out-of-county tuition, make sure that students know how to take advantage of the law.

Reconciliation of Old and New Program (Figure 26)

(This display will not appear if your version of SIGI lacks local information for the Planning system. It is shown only to students who are or have been previously enrolled at any college at the time when they sign onto SIGI.)

The display telling students how to reconcile the program recommended for an occupation with courses they have already taken is prepared, or at least edited, by your college. Therefore the students' display may differ somewhat from the one illustrated in figure 26. The intention, however, will be the same.

Obviously, you will have to be familiar with the symbols used in the display--the deletions, question marks, and double question marks in the figure. The procedures specified for the student in the display are not suggested with the hearty confidence that many students will be able to follow them successfully. They are really set forth to give the students a method of making a preliminary judgment as to whether they will lose credits if they transfer and to give them a feeling of active participation in the plans for their future. In reality, most of the burden of switching into the new program with a minimum sacrifice of credits will fall on your shoulders.

The circumstances of students vary so widely and the distribution requirements of colleges differ so greatly that this handbook cannot help you much. Clearly, you want to salvage as many of the students' credits as you can, and you want to preserve the integrity of the programs recommended for the students' occupational goals. As explained previously, be very cautious about substituting other courses for courses specified in the program display. If enrolling in the new program will force the students to spend an additional semester in college, it is probably better for them to do so in their local college than in some more expensive transfer institution.

Financial Aid (No Figure)

(The displays showing the sources of financial aid will not appear if your version of SIGI lacks local information for the Planning system.)

Students may elect to see and get printouts of a series of five displays outlining the major sources of financial aid for education. The last in the series gives the title and office address of the local financial aid officer. The displays are not tied to a particular occupation or group of occupations.

The information in the displays is necessarily sketchy. The main purpose of the sequence is to convey a message of hope and to generate some follow-up action from the students.

If your college has a financial aid officer, send inquiring students to him/her. Financial aid is tricky, often dependent on the whims of bankers, and subject to changes of rules in every session of Congress or the State legislature. It is hard to keep a single person abreast of developments, let alone an entire counseling staff.

If your college does not have a financial aid officer and you do not have access to regularly updated information, write to your State department of higher education and see if they have a pamphlet showing available Federal and State programs.

If your college does not have the complete Planning system, students will see a display telling them that various sources of aid exist. It advises students to go to the local financial aid officer, but of course it cannot specify who he or she is. Students may ask you for more complete information. No printout of this display is available.

HELPING STUDENTS USE PLANNING

Students should not really need help in using the Planning system. The interaction is linear with a minimum of branching, and the displays consist almost entirely of factual information. It is as straightforward as a highway map.

Nevertheless, if an occasion arises when you want to go through PLANNING with a student at the terminal, pick an unused DEMO number for the purpose. Set your status at 7 (initiate) so that you have the maximum number of options at the outset. In selecting occupations, ignore the "Reminder List," since it contains a set of dummy occupations.

If the selected occupation is one for which a prediction is available, go immediately from PLANNING to PREDICTION and get the prediction for the program named in the display illustrated in figure 21. As an initiate, you can conveniently go back and forth between the two systems.

See Chapter VII of this manual for a discussion of the Prediction system.

160 Mechanical Engineer

1. Enroll in mechanical engineering in college.

2. If you start in a community college, enroll in engineering science program. Select a 4-year college with a bachelor's program in mechanical engineering. Take courses required for transfer.

3. Get bachelor's degree. In some schools this requires a fifth year of study.

4. Check licensing or registration laws in the state where you wish to work. You may be required to pass an examination to become registered.

5. Graduate training required for most teaching positions.

For a copy press PRINT; otherwise press NEXT.

FIGURE 20

The occupational overview display. Interaction in the Planning system would, in effect, stop here if the local college had not yet input the data necessary to carry on the rest of the interaction. In that case, the specialized displays naming the local programs of study, prerequisites, and so forth would be replaced by a display advising the student to seek help from a counselor. The display illustrated in figure 20 may also appear in STRATEGY to give the student a basis for estimating his chances of actually completing all the steps necessary to enter his occupation

160 Mechanical Engineer

Engineering Science

This same program is the one that you should ask about in the Prediction system.

At your first opportunity, return to that system and ask about the program.

If the prediction shows that your chances of getting C or better are small, do some heavy thinking before you jump into this occupation. (Remember, the chances of getting C or better are the chances of getting A or B plus the chances of getting C.)

You will want to take a copy of this display to PREDICTION. Press PRINT.

FIGURE 21

Display naming the curriculum recommended for the student's occupation, mechanical engineer. The student can return to the Prediction system and ask for a prediction for Engineering Science. The prediction may then be added to other information obtained from COMPARE and PLANNING, and the student can make an informed judgment about mechanical engineer. If more than one program could serve as the route into the occupation, all would be listed. If the occupation required postgraduate study, the wording would emphasize the need for getting a grade of B or better rather than C.

160 Mechanical Engineer

HIGH SCHOOL PREREQUISITES FOR THIS PROGRAM

High school diploma or equivalent
One year of chemistry
One year of physics
Three years of math, including second-year algebra and trigonometry

If you have not completed the prerequisites, you may not be allowed to take some of the courses in your program of study. You will have to take lower level courses first, and this will put you behind schedule. You can

1. Get back on schedule by making up work in summer school.
2. Take longer to graduate.
3. Get back on schedule by taking extra courses during a semester.

Each case is different. SEE YOUR COLLEGE COUNSELOR OR COLLEGE ADVISER.

You will want a copy of this information. Press PRINT.

FIGURE 22

The high school prerequisites display. The display is prepared by local staff, and the wording will vary depending on whether prerequisites are mandatory or only recommended. The prerequisites differ from one curriculum to another. The computer selects the list of prerequisites for the curriculum recommended for the student's occupation and inserts it into the frame display.

160 Mechanical Engineer

FIRST SEMESTER
EG 101 Language & Lit. I
MA 111 Math Analysis I
CH 101 General Chemistry
EN 103 Engineering Graphics
PH 103 Univ. Physics I
MA 113 Computer Program. I
EN 501 Engineering Orient.
Health & Phys. Ed.

SECOND SEMESTER
EG 102 Language & Lit. II
MA 112 Math Analysis II
CH 102 Gen. Chem. & Qualitative Analysis
EN 106 Descriptive Geometry
PH 104 Univ. Physics II
MA 114 Computer Program. II
Health & Phys. Ed.

THIRD SEMESTER
MA 211 Math Analysis III
PH 213 Univ. Physics III
CE 205 Statics
Soc. Sci. Elect.
Technical Elect.

FOURTH SEMESTER
MA 212 Math Analysis IV
PH 214 Univ. Physics IV
CE 206 Dynamics
Soc. Sci. Elective
Technical Elective

For a copy press PRINT.

FIGURE 23

The program of study display showing the local curriculum recommended for the student's occupation, mechanical engineer. The display was prepared by the local staff and represents their best judgment with respect to the courses a qualified entering student without academic deficiencies would take to begin preparation for the occupation. The format of the display, name of the curriculum, and the names and numbers of the courses would be different at each college.

```
                    160 Mechanical Engineer

Accredited bachelor's programs in mechanical engineering are offered at the
following colleges near you:

NEW YORK                NEW JERSEY                    PENNSYLAVANIA
City College-CUNY       Fairleigh Dickinson Univ.     Drexel Univ.
Columbia Univ.          Newark College of             Lafayette College
Cooper Union              Engineering                 Lehigh Univ.
Manhattan College       Princeton Univ.               Univ. of Pennsylvania
New York Univ.          Rutgers Univ.                 Villanova Univ.
Polytechnic Institute
  of Brooklyn
Pratt Institute


WARNING: List not necessarily complete.  Check catalogs in your college library
         or counselor's office.

For a copy press PRINT.
```

FIGURE 24

Display showing recommended transfer institutions. This display appears only if preparation for the student's occupation (mechanical engineering, in this case) requires transfer to a four-year college or specialized institution. The display is prepared by local college staff. It lists only those colleges that local students are likely to transfer to. If preparation requires postgraduate study, the display would name appropriate nearby graduate schools in addition to four-year colleges.

218 Wastewater Treatment Operator

Mercer County Community College does not offer WASTEWATER TREATMENT. You can get training at the New Jersey community colleges named below:

2-year Associate degree program in Environmental Health Science Technology (including wastewater treatment):

Middlesex County College, Edison

Nondegree programs in Advanced Wastewater Treatment Operations are offered at:

- Morris County College, Dover
- Middlesex County College, Edison
- Ocean County College, Toms River

You can take the required introductory course at a vocational-technical high school near these colleges.

Your counselor can tell you how to enroll in these programs without paying extra tuition.

You will want a copy of this information. Press PRINT.

FIGURE 25

Display referring student to other institutions. The display, prepared by local staff, appears as a substitute for the prerequisites/program sequence if the local college does not have a curriculum that prepares the student for the selected occupation.

Will you lose credits if you switch to this new program? To find out, follow these steps:

1. After signing off, look in your new program for courses you have already taken.
2. Cross off your new program any courses you have already taken.
3. Can you SUBSTITUTE a math course you have already taken for a math course in the new program? If you think you can, place a question mark (?) beside the math course in the new program.
4. Follow step 3 for courses in social science, science, and English.
5. Does your new program have free electives? If so, courses you have already taken may fit in there. Place two question marks (??) beside such courses in the new program.
6. Now take your new program to your counselor, who will know what the question marks mean and will help you get into the new program with the least loss of credit.

You will want a copy of this display. Press PRINT.

FIGURE 26

Display with instructions for reconciling old and new programs. The display is shown only to students who have indicated that they are currently enrolled or have been previously enrolled in a college program. The local college may edit the display, with the result that the wording and the symbols suggested for the student to use may differ from college to college.

CHAPTER IX

STRATEGY

COMPARE, PREDICTION, and PLANNING all provide information of various kinds that should be considered in the choice of an occupation. Of course, one might reject an occupation out of hand on the basis of the information provided by any one of these systems alone. For example, COMPARE might reveal that an occupation offered unsuitable income or distasteful work activities; PREDICTION might eliminate another occupation because the key course prediction for it was abysmally low; PLANNING might scratch a third because preparing for it required a long period of apprenticeship.

But some candidate occupations will have survived all three systems. How is one to assess the considerable amount of information that has been accumulating about these occupations? How can one distinguish the more important from the less important, the feasible from the impossible, and combine all the information so as to make a reasonable choice?

STRATEGY, as the name of the system implies, proposes a strategy for combining all of these elements so as to reach a decision. It assumes that the decision-maker has appraised his values and examined the classes of information provided by COMPARE, PREDICTION, and PLANNING. In brief, it proposes a method for combining rewards (opportunities to satisfy values) with risks (the uncertainty of completing all the steps for entry).

No strategy can promise to deliver the "best" decision in the sense that that decision will inevitably work out better than its rivals. A strategy cannot really be measured by its results, but only by its methods. The best strategy is the one that leads to a decision made rationally upon the basis of the maximum amount of relevant information. Therefore, in the Strategy system the emphasis is placed upon the method rather than the results.

WHAT THE STUDENT DOES

Novices

Students begin by following the thought processes of an imaginary person named Louis Logic as he sets about deciding which of three cars to buy. Logic follows the SIGI paradigm by first identifying and weighting four values that he wishes his purchase to satisfy. He then collects information about the candidate cars and rates them (grades them) on their capacity to satisfy each of the four values. Then, for each car, he multiplies the weight he had assigned to each value by the car's rating on that value, and he adds the four products to obtain a "desirability sum." He decides to buy the car that has the highest sum because it will provide the most overall satisfaction, even though it may not be the best with respect to one value or another.

Further displays establish that another of the three cars would suit Lois Logic best because she weighted her values differently from Louis. The third car would be best for yet another set of value weights.

Now, since values are obviously important in decision-making, students are invited to review their own value weights. If they accept the invitation, they see their value profile just as they left it the last time they were in VALUES. They may change the weights at will, but with the usual restriction that the sum must total 40. They may also change their designation of interest field. When they have adjusted their weights to reflect their latest thinking, or if they have declined to review their weights, they select three occupations for consideration in STRATEGY. The occupations may be taken from the "Reminder List," from the SIGI bank of occupations, or from a mixture of the two. Students indicate which of the three occupations they would enter at this stage of their thinking.

Novices now see a series of displays that repeats the process of building up desirability sums for the three selected occupations, as was done for Logic's three automobiles. The ratings of the occupations are displayed for one value at a time. At their option, students may see the information that explains why the occupations are rated as they are on the value under consideration. When the ratings for all ten values have been displayed, the ratings are multiplied by the value weights and the products are added to produce the desirability sums for the three occupations.

The occupations are now ranked in accordance with their desirability sums and are compared with the students' designation of first choice. The students can see which of the occupations is most desirable in terms of the values alone, with no consideration of the difficulty of entering each occupation.

Students then engage in some interaction with regard to the risks of failure in attempting entry into an occupation. They see that the desirability is irrelevant if the occupation is impossible to get into. Likewise, ease of entry is irrelevant if the occupation offers no satisfactions, once entered. For occupations that are neither impossible to enter nor so miserable as to be unworthy of entry, a sensible strategy is to assess rewards and risks in combination: A high reward may be worth considerable risk; safety may warrant a lesser reward. Both must be judged together.

The students are asked to estimate the probabilities of entering the three occupations. They see the occupational overview for each occupation and estimate the chances in 100 that they will complete all the steps for entry. When the risks have been thus estimated for the three occupations, students again designate the occupation they think would be best. They then see a display comparing their first-choice occupation with the other two occupations with regard to desirability and riskiness.

Finally, if their SIGI has a Prediction system, students have the option of seeing how to use it as a check on their estimate. (If there is no Prediction system, students are advised to see a counselor for this purpose.) Then the novice is promoted to initiate and given the choice of seeing STRATEGY again or going to the "menu."

Initiates

Initiates are given the option of omitting the sequence showing how Logic developed desirability sums for automobiles. They may also bypass the display that builds up their desirability sums one value at a time.

They also may bypass the sequence explaining how to develop a strategy based on rewards and risks, going instead directly to estimating their chances of successful entry.

PRINTOUTS THE STUDENT MAY GET

1. Values Profile

All students entering STRATEGY are invited to review their value weights and adjust them to conform to their most recent thinking. If they accept the invitation, they return to their value profile just as they left it the last time they were in the Values system. (They may also change their designation of interest field, but they get no printouts of their choice.) They may readjust their weights, with the same restriction as before--that the weights must sum to 40. The printout of the profile is illustrated in figure 8, Chapter IV--VALUES.

2. Chart of Desirability Sums

All novices, as well as intitiates who elect to see their desirability sums built up one value at a time, get a printout of the chart showing the sums and their derivation (figure 27). The printout shows the ten values and the student's weight for each, the rating of each of the three occupations on each value, the products of the weight times each rating, and the sum of the products (desirability sums).

3. Basis of Rating on Any Value

When the chart illustrated in figure 27 is being constructed, the three ratings for High Income first appear, and the students are asked whether they want to see the information on which the ratings are based or want to go on to the ratings for the next value, Prestige. The process is repeated every time a new set of ratings appears. Exercising the option to see the information produces the same effect as asking a question in COMPARE. For High Income, the computer displays the answer to question number 11, figure 14, (average income); for Prestige, the display is the answer to question number 17 (prestige level). As in COMPARE, the student may get a printout of any answer. It is exactly like the printout illustrated in figure 15, Chapter VI--COMPARE.

4. The Occupational Overview

When the students estimate their chances of getting into each of the three occupations for which they have desirability sums, they inspect the overviews of the occupations as an aid in forming a judgment. This is the display illustrated in figure 20 for the Planning system. Getting a printout is optional.

5. Chart Showing Desirability Sums and Chances

Students may get a printout of the display that shows the desirability sums of the three occupations they selected for STRATEGY, the estimates they rendered of their chances of getting into them, and the occupation that they designated as their first choice of the three. The discussion portion of the display varies depending on how the first-choice occupation compared with its rivals with respect to desirability sums and estimated chances. Figure 28 illustrates the discussion of the situation arising when the first-choice occupation has the highest desirability sum but not the highest estimate of chances.

6. Explanation of Use of PREDICTION

Students are urged to use the Prediction system to confirm their estimate of their chances of entering the occupations. Use of the Prediction system requires two steps, the first being access to PLANNING to discover which curriculum to ask about in PREDICTION, and the second being access to the Prediction system itself. This procedure is explained in the display reproduced in figure 29. This display and numbers 7 and 8 will not appear if your version of SIGI does not have a Prediction system.

7. Names of Programs for PREDICTION

If students follow the procedures suggested in the previous display, they will learn in the Planning system the name of the curriculum that prepares for each of the three occupations. This information is presented in the display illustrated in figure 21, Chapter VIII--PLANNING.

8. Prediction Chart

If the students actually use the Prediction system in conjunction with STRATEGY, they may get a printout of the chart containing the predictions. The chart is reproduced as figure 16, Chapter VII--PREDICTION.

THINGS FOR THE COUNSELOR TO LOOK FOR

In spite of the great amount of explanatory material in STRATEGY, the system may be hard for some students to understand. Although they may accept the results, they may not comprehend how the results were obtained. Consequently, they find themselves blindly obeying a set of magic numbers that have materialized on the screen, whereas we want them to develop a decision-making strategy of their own.

If students choose to discuss their STRATEGY experience with you, you will, of course, want to make sure that they understand the outcome of the competition between the three occupations. More importantly, however, you want them to understand the strategy that produced the outcome. There are three areas to look for in which the students' understanding may be less than complete. They are (1) the computation of desirability sums, (2) the estimate of probabilities of entry into the three occupations, and (3) the application of a strategy based on rewards and risks.

Computation of Desirability Sums

(Appendix A contains a discussion of the differences between weights and ratings. If students are confused by the terms, refer to this appendix for an analogy that may--or may not--make the distinction clear. Briefly, the weight assigned by the students to a value is an expression of the importance of that value to them. The rating carried by an occupation on a value is an expression of the opportunity found in that occupation to satisfy that value.)

The weights assigned by a student to any value and the rating of any occupation on that same value occupy two entirely separate domains. For example, the amount of, say, prestige offered by an occupation is determined by forces that are quite indifferent to the way you or I may yearn for recognition.

When these two domains come together, as they do when you (with your values) contemplate an occupation (with its potential to satisfy them), we need a new scale that is neither weight nor rating to show how the two domains interact. We could call this new scale a desirability scale. A convenient way to construct the scale is simply to multiply the value weight by the occupational rating and to use the product as a way of combining the two domains. Obviously, when both the value weight and the rating are high (a very desirable situation because you can get a lot of what you want a lot), the product will be large. When both are low, the product will be correspondingly low. When both are intermediate, the product is intermediate. When one is high and the other low, the product is slightly lower than the intermediate case.

By summing the products that constitute the desirability scale, we can derive the desirability sum. This sum, combining information from the domain of individual values with information from the domain of occupational characteristics, is an index of the utility of each occupation for a given student.

The desirability sums, therefore, contain much information. They include the students' weights, the occupational ratings, and the index of over-all utility. Students should be encouraged to look at them not just as numbers to be compared, but as compact summaries of information. To see them this way, students should understand the rationale behind them.

Occupational ratings. Every time the numerical ratings appear for a value, the display explains their meaning. Since students had no part in assigning the ratings, they may not understand them to the same extent that they understand the value weights that they generated themselves. The ratings are analogous to weights in that the higher the number, the more favorable the rating; that is, an occupation with a high rating provides more opportunity to satisfy the rated value than does an occupation with a low rating. However, the scales of the ratings are different from the scale of the weights. Weights run from 0 (no importance) to 8 (great importance). The ratings are scaled in accordance with the table below:

TABLE II

SCALE OF OCCUPATIONAL RATINGS

	Rating				
Value	1	2	3	4	5
High Income	Less than $8,000	$8,000 to $10,999	$11,000 to $14,999	$15,000 to $19,999	$20,000 or more
Prestige, Helping Others, Security, Variety, Leadership	Less than average	Average	More than average	A great amount	
Interest Field	Poor fit	Occasional fit	Substantial fit	Good fit	
Leisure	Small amount	Less than average	Average	More than average	
Early Entry	5 or more years*	No more than 4 years*	No more than 2 or 3 years*	1 year* or less	

*beyond high school

You may notice that the ratings are essentially numerical equivalents of the verbal specifications used in LOCATE to retrieve occupations. For example, with respect to Leadership, the expression A more than average amount is equivalent to the number 3. In LOCATE the verbal form of the rating is used; in STRATEGY, where computations are done, the numerical form is used.

Notice also that, except for High Income, which is rated on a five-point scale, the ratings are on a four-point scale. Notice further that a rating of 2 generally represents an average amount, except for Leisure, where 3 represents an average amount. The rating of Interest Field shows to what extent the activities typically involved in an occupation fit the field selected by the student, with 4 representing a very good fit.

How do you make all this clear to puzzled students? We suggest that you use in your explanation the similarity between value weights and occupational ratings. By the time they have reached STRATEGY, students are probably familiar with the concept of value weights, partly because the weights have been referred to so often and partly because they assigned the weights themselves. Therefore they accept that higher weights represent greater importance or more desire. Now lead the students to see that higher ratings also mean "more," but this time concerning occupations, not themselves. If you have been successful in your explanation, your students will realize that ratings are to occupations what their value weights are to them. The weights represent what the students want; the ratings represent what is there. The product of these two measures represents the interaction between wants and resources. And the desirability sum represents that interaction across all ten values.

Characteristics of the Desirability Scale

Note (Figure 27) that the scale of possible desirability sums runs from a minimum of 40 to a maximum of 168. If the student questions this range, it can be explained as follows.

To obtain the minimum desirability sum, an occupation would have to receive the minimum rating of 1 on every value. Since the Values weights must always sum to 40, the sum of the products would then be 40, no matter how the Values weights were distributed.

To obtain the maximum desirability sum, an occupation would have to receive the maximum rating on every value. This would be 5 on Income, and 4 on the other values. Assume, then, the highest possible weight of 8 on Income, a weight of 4 on each of eight other values, and--of necessity--a weight of 0 on the remaining value. These products--40 plus eight 16's--sum to 168.

What about the suggestion that a difference of less than 10 points between desirability sums should not be regarded as significant? It is extremely difficult to estimate an appropriate "error" term for these desirability sums. Yet intuitively we sense that there must be some "error" in them. How can we conceptualize the possible sources of error in each major component--the values weights and the occupational ratings?

The values weights have resulted from an extended and intensive examination of the individual's values, during which distinctions will have been sharpened and flabby responses trimmed down. While these weights may change over a period of time, such changes can not be regarded as a manifestation of error since they would presumably reflect actual changes in the students' values system. Instead, error must be conceptualized in terms of the variation that would occur if a student could weight his values an infinite number of times on any one occasion, without recollection of effect from one weighting to the next. In other words, error would occur when a student feels indeterminate about the weights assigned to any dimensions and is likely to vacillate between alternative weights to assign.

To get some sense of the frequency and magnitude of indeterminacies, we interviewed a small sample of students who had just completed the values weighting. We tried to induce them to make changes, focusing particularly on pairs of values weights that differed by one point. Most students declined to change weights when pressed to do so. The few who were willing to change never changed a weight by more than one point. (Because of the constraint of distributing a fixed sum, any change in one value weight of course required a compensating change in another.) Typically, the change would be made in two values already weighted relatively low. For example, a student might go from 2 to 3 on Leadership and 3 to 2 on Prestige.

Error (i.e., variation of this nature) on this component of the desirability sum is not a cause of great concern, since students are encouraged to go back to STRATEGY with revised values weights at any time and compare the effects of such changes on desirability sums. Thus, in cases of true indeterminacy, the student can test both profiles to see how much impact the changes have on the desirability sums.

The possibility of error in the other component, the ratings of occupations on their instrumentality for providing satisfactions, is more troublesome. Despite careful operational definitions of each scale point for the ratings, painstaking scrutiny of numerous sources of data, development of uniform procedures explicitly described in a manual, thorough training of raters, review of experts in each occupation, and other such safeguards, these ratings do depend on human interpretation and judgment. Human judgment is inevitably fallible. In this sense, error might be conceptualized as a function of the reproducibility of the ratings. That is, one would expect high agreement between independent ratings by judges who were equally well trained in the procedures and used equally comprehensive sources of data.

To establish a "worst case" index of reproducibility, we selected a sample of the most difficult dimensions and assigned staff members to rate a number of occupations on them independently. These independent ratings were compared and found to be in high agreement. The rare instances of disagreement never exceeded a one-point difference. These differences were resolved by consensus; the process of resolution often contributed to sharpening of definitions and procedures. Thus, the occasional one-point difference is a "worst case" not only because of the deliberate selection of difficult dimensions, but because in practice the final rating comes after consultation and agreement between at least two staff members.

Finally, then, the 10-point standard for a "significant difference" between desirability sums was established by generating a number of hypothetical indeterminacies in values weights and running them through a sample of occupational ratings first with one profile of values weights and then with an alternative profile. Over 95% of the differences between successive sums obtained in this way were less than 10 points.

Estimation of Probabilities of Entering Occupations

Students must estimate the probability that they will succeed in entering each of the three occupations they selected for STRATEGY. The probability is entered as a one- or two-digit number representing "chances in 100." As an aid in making the estimate, students see the overview display for each occupation (figure 20, Chapter VIII). The estimates will obviously be very imprecise, and some students may feel uncomfortable about engaging in a guessing game involving an important decision. They may seek your help or reassurance or both.

Purpose of the estimates. If the estimates are admittedly so inexact, why make them at all? The answer is that, without some assessment of the probability of success, students are tempted to make occupational choice on the basis of desirability alone. If one could enter any occupation one chose, there would be no need for any other consideration. But pure desirability must be tempered by harsh reality if one is to choose wisely, and the estimates are the best available assessment of that reality. Poor as they are, they are better than nothing, and probably much better than blind dependence on hope or luck. At the very least, they compel the student to recognize that entry into an occupation is not automatic.

Imprecision of the estimates. There is no way that you can tell how close the students' estimates may be to the true probability of their successfully entering an occupation. However, it is not so important that the estimate be exact with respect to any single occupation. What is important is that the estimates be realistic in relation to one another. That is, the chances of successfully completing all the steps to become a physician are much slimmer than the chances to become a police officer, and you would expect students' estimates to reflect the difference. Similarly, you would expect students with low academic ability to estimate fewer chances in 100 of entering an occupation that required extensive formal education than one that required only a little education.

For example, suppose we were granted exact knowledge of a student's probabilities with regard to physician, police officer, and wastewater treatment operator. And suppose also that we know the student's estimates as shown in the following table:

Occupation	True probability	Student's estimate (chances in 100)
Physician	.000001	20
Police officer	.35	60
Wastewater treatment op.	.70	90

Note that the student has considerably overestimated all the probabilities, and grossly overestimated the probability for physician. Nevertheless, the estimates provide useful input for a decision. They say, "The risk of going for physician is much greater than the risk for the other occupations. Wastewater treatment operator carries the least risk." This is the kind of information the student should be thinking about in reaching a decision. The inaccurate estimates would be mischievous only if the student had got the estimates all wrong in relation to one another or had so exaggerated his chances that he embarked on a course with no sense at all of the risks. If, for instance, the student had estimated that his chances of becoming a physician were better than his chances of becoming a police officer, or if he enrolled in premedicine because 20 chances in 100 looked good despite his C in biology and D in chemistry, then his estimates would have been harmful rather than the reverse.

Helping students make estimates. If you cannot make statistically valid estimates, how can you assist students in making estimates that are at least useful? The following guidelines may help.

1. For students with low academic ability, chances are poorer for successful entry into occupations that require much academic preparation than for occupations that require little or none. This statement is just another way of making the obvious pronouncement that it is easier to get into an occupation that draws on one's abilities than an occupation that goes counter to them.

2. If an occupation requires a special talent, the chances go down in proportion to the student's lack of that talent. Examples are such occupations as artist, musician, actor/actress, and many others. (With many such occupations you are not actually estimating the chances of entry into the occupation, but chances of making a living from it. Anyone can "enter" the acting profession simply by declaring that he is an actor, regardless of the number of parts he gets in actual productions.) One of the main problems in making estimates for such occupations is determining whether or not students have talent. You can advise them to solicit the opinion of teachers or members of the profession who know their work. A second difficulty with such occupations is that luck seems to play an inordinate part in success, and that is an element impossible to gauge. Perhaps the best you can do for students headed for the special

talents occupations is to keep them from being wholly unrealistic about their prospects.

3. The more steps an occupation requires for entry, the smaller the chances that the students will complete all of them. If, for example, students wish to become librarians, they must complete all of the following steps: be accepted into a community college program, complete a transfer curriculum, be accepted at a four-year college, get a bachelor's degree, be accepted into a graduate school of library science, successfully complete the librarianship program, and find a job as a librarian. Each of these steps has its own probabilities. For instance, the student might get a bachelor's degree but not be accepted into the graduate program, or might complete all of the preliminary steps but still fail to get a position as librarian. To the extent that the steps are independent events, the probability of completing all of them is the probability of completing the first times the probability of completing the second times the probability of completing the third, and so on, with the results that the probability of completing all of them is minuscule. Actually, the steps are not entirely independent, and so the cumulative probability is not impossibly low. Nevertheless, the probability of becoming a librarian is clearly less than the probability of becoming a teacher aide with only two steps to entry (some course work or training and finding a job).

In helping students make estimates, you have to keep all these factors in mind at the same time--the abilities of the student, the special requirements of the occupation, and the number of steps to entry. Although you will never feel confident that the estimates are exactly on target, you can take satisfaction from the knowledge that they will often reveal useful differences in the risks involved in choosing among occupations.

Use of the Prediction system. If your version of SIGI has a Prediction system and if the curriculum preparatory for a selected occupation is one that can be predicted at your college, you can use the Prediction system to help make estimates in STRATEGY. The procedure requires that you go to the Planning system to learn the name of the curriculum to ask about, and then to the Prediction system to get a prediction for that curriculum. (If you know positively which curriculum prepares the student for the occupation, the detour to PLANNING is, of course, unnecessary.)

The prediction will show only the probability of completing the first step toward entry--the probability of completing a key course in the required local curriculum. You still must estimate the probability of completing all the other steps.

The prediction is especially useful if preparation requires considerable academic work--that is, a favorable prediction suggests a favorable outcome to all the academic steps that must be taken because those steps are more or less like the one predicted. The prediction is less useful if later steps are different from the one predicted.

As explained in Chapter VII, the predictions show the chances of getting a grade of A or B, a grade of C, or a grade below C-. You have to make a judgment as to what this statement means in terms of "success" in a step towards entry into the occupation. In most cases, a grade of C or better accomplishes the purpose, but for some occupations (those requiring graduate training) a grade of A or B is more realistic.

Unrealistic estimates. Some students, in a glow of optimism, rate their chances much higher than they could possibly be. For example, one would-be actress estimated her chances as 99 in 100. She probably would have rated them 100 in 100 if the computer had accepted the larger figure.

When the estimate is manifestly unrealistic, you should try to bring the students down to earth. You can try to lead them to making a separate estimate for each step toward entry; then you can point out that the probability of completing all the steps must be less than the probability of completing any one of them. In no event can the probability of completing all be greater than the smallest of the separate probabilities. For example, if a student estimates 80 chances in 100 of entering an occupation, but admits that the chances of passing the preparatory curriculum are only 75 in 100, you can point out that the estimate for entry is impossible. As long as entry into the occupation depends on finishing the college program (and it may not depend on it in all cases), the student's chances of successful entry cannot exceed 75. Actually, two steps are involved, completing the college work and getting a job. Since neither is a dead certainty, the chances of completing both would be less than the chances of completing either step--they would have to be less than 75.

A student's unrealistic estimate may be due to some emotional need rather than to lack of information or to naivete in thinking about probabilities. This is one of those counseling problems that are completely beyond the scope of SIGI or this handbook.

Demoralizing estimates. If students who do not do well in school are contemplating "high level" occupations, you may have the problem of making estimates that are realistic and yet not utterly demoralizing.

SIGI solves the problem by setting a lower limit on estimates; it does not allow students to estimate that their chances are less than one in one hundred, even though the "reality" may be that they have only a tiny fraction of one chance. Since even the most careful estimate is likely to contain a large error, and since the main purpose of the estimates is to make students think about the risks of aiming at various occupations, it is not necessary to club the students over the head with their inadequacy for any particular occupation. We hope that the "reality" of both predictions and estimates can sometimes be softened a little without causing harm.

Application of the Decision-Making Strategy

Some students may not understand the concept of a strategy, particularly one for integrating two abstract things, rewards and risks. Yet use of a strategy is a crucial step in decision-making, for without it the final act degenerates into a thoughtless leap toward the option that "feels good" or is most easily accessible.

If your students seem confused about the nature of the SIGI strategy, try to explain it to them. The reward for success is worth the risk of failure.

Rewards. The "reward" for success in entering an occupation will vary from student to student, depending on individual values. If students do not understand what you mean by reward in connection with an occupation, tell them that the reward is the answer to the question, "What do you like about this occupation? Is it the salary (High Income)? The feeling that you are looked up to because you are in it (Prestige)? The fact that there is no sex discrimination (not one of the ten weighted values, but a value for some people)?"

Notice that the satisfactions that are named in answer to "What do you like about this occupation?" are the answers to the questions in COMPARE. Any piece of information in COMPARE may cause the response, "Oh, I like that aspect of this occupation." In other words, it becomes part of the total reward associated with an occupation.

Many different satisfactions of various degrees of importance contribute to the reward aspect of an occupation. Keeping track of all of them would be impossible without some system of bookkeeping. The desirability sums serve that purpose. They summarize in one figure much information about the student's likes and the occupation's capacity to cater to them. The desirability sums are limited, however, to the ten values weighted by the student. Other items of information may also prove attractive. Students may like the physical surroundings, the fringe benefits, the employment outlook, opportunities for advancement, and many other qualities that are not accounted for in the desirability sum. When these aspects of an occupation are important to the decision-maker, they should be considered in the decision. In short, the desirability sum does not necessarily represent the total reward offered by an occupation.

The important thing for students to see is that rewards can be treated in an orderly way. The method used in computing desirability sums can be extended to include any item of occupational information that the student wants to consider. By weighting its importance in the same manner as weighting a value, students can assure themselves that a trivial item does not add disproportionately to the total reward. In most instances, the SIGI desirability sums provide all the information the students will need for determining rewards.

Risks. Risks are harder to assess than rewards. First, it is often hard to get information about risks. Although you may be in a good position to estimate the probability that a student will be accepted at a State college, how can you estimate the probability that he will get a position in his desired occupation upon graduation four years hence? To what extent are these two probabilities independent?

Second, it is not clear what a student has lost if he has invested time, effort, and money in preparing for an occuaption and then has failed to enter it. Surely there has been some loss, for the desired outcome did not occur. But some of the acquired skills may be useful in other occupations, and the educational experience probably had some social and personal value. Therefore, the amount of the investment that was "lost" is debatable; at any rate, it is nearly impossible to quantify.

One way to get around this difficulty is to say that by risk we mean merely the probability that you will not succeed in entering a chosen occupation. We will exclude from risk the idea of loss--that is, we will exclude the consequences of failing to enter.

Defining risk as "probability of failing to enter an occupation" makes the risks side of the reward/risks equation easier to quantify: you estimate the risk for each step, using the guidelines suggested earlier under the heading "Helping students make estimates." Generally, the more steps that are required for entry, the greater the risks. (Also, the more steps, the greater the "loss" will be if the student fails to enter. For example, a person with a Ph.D. who can find employment only as a cab driver has in one sense suffered a greater "loss" than a surveyor forced into the same livelihood. Therefore, our narrow definition of risk does have a sort of "loss" factor after all.)

Rules for a strategy of rewards and risks. The strategy proposed by SIGI incorporates three rules. The first two are easily disposed of, but the third is tricky.

Rule 1. If the reward offered by an occupation is too small or if the risk of entering it is too large, reject the occupation. An occupation may fail to provide some minimum level of a value of overriding importance: the salary may be too low to furnish a living, or the educational requirements may be beyond the student's physical resources. Or an occupation may run counter to some important value, as when, for instance, it requires work that causes pollution or is injurious to the health. Or it may simply have an unacceptably low desirability sum, as do many "low level" occupations for a person who has heavily weighted High Income, Prestige, Leadership, Independence, and Variety.

It is also easy to think of examples of occupations attended by impossible risks. Persons afflicted with arthritis cannot reasonably aspire to become ballet dancers. Other situations may involve risks that are not downright impossible but are yet so high as to be unacceptable to some students. Many bright students shy away from dentistry or medicine because they believe their chances of being accepted for professional training are so poor.

Note that Rule 1 does not require the simultaneous assessment of rewards and risks. Either alone can kill an occupation. Notice also that Rule 1 concerns only rejection, not acceptance.

Rule 2. If an occupation offers the greatest reward and also the smallest risk, choose it. This rule is self-evident. Remember, however, that in STRATEGY occupations are considered three at a time. The "winner" in one set under Rule 2 might not be the best occupation in all sets.

The SIGI strategy offers no rules for other combinations of reward and risk. The "best" occupation for any student might be the one with the greatest reward, the one with the least risk, or one with neither. Consider the following possibilities:

	Desirability Sum	Student's estimated probability of successful entry
Occupation A	140	.35
Occupation B	110	.52
Occupation C	80	.65

Let us assume that no occupation is so risky or low in desirability that it would be rejected under Rule 1. No occupation falls under Rule 2. Which occupation is "best"? One student might say A on the grounds that the desirability compensates for the increased risk. Another might say C, arguing that the increased safety compensates for the reduced desirability.

Actually, if all the information in the chart is accurate, it can be demonstrated that occupation B has the best combination of reward and risk. If you multiply the desirability by the probability, the resulting product is a measure of the overall sufficiency of the occupations. The products are as follows:

Occupation A	49.0
Occupation B	57.2
Occupation C	52.0

Unfortunately, we dare not make the multiplication on SIGI (nor do you dare make it in your office) because the error of the estimates is likely to be large. What is worse, we do not know how large it may be in any given case, or even whether errors run in the same or different directions. Notice that increasing the probability estimate for either occupation A or C by as little as ten percentage points would cause that occupation to have the largest product. If the estimates for A and C are understated by ten points, or the estimate for B is overstated by a similar amount, the multiplication might lead us astray instead of helping us.

If, then, there is no clearcut strategy for these situations, how can you help students reach a decision? The best you can do is to help them confront the problem in some systematic way. You can suggest that they ask these questions:

1. Is the spread quite narrow between the highest and lowest estimate? The error of estimate is likely to be so large that small

differences should be ignored. The student might as well choose the occupation with the highest desirability sum.

2. Does the student have an overriding interest in one of the occupations? If so, ask the student whether this feeling has a rational basis. If the desirability of the preferred occupation is grounded in the student's values, and the student knows it (he has researched the occupation), the student should seriously think about accepting increased risks in order to obtain the desired reward. You must, of course, make clear to the student that going after the occupation involves increased risk of failure. Except in the case of Rule 1, no decision should be made on the basis of rewards without thought of risks, or the reverse.

3. Are the occupations fairly close with regard to desirability and is there a wide range in the risks? If so, the student should consider the occupation with the least risk, particularly if the student's value profile is rather "flat." Emphasizing risks is especially important for students with low or mediocre academic ability who are choosing among occupations with varying educational requirements. A choice based primarily on risks will necessitate some sacrifice in desirability; students should go to COMPARE to check the most important (to them) features of all the candidate occupations before they commit themselves to any one.

4. Is the student considering all the options open to him, or is he making a choice only among a single set of three? Since STRATEGY considers only three occupations at a time, there is a tendency to regard each set as a unit rather than to combine all sets for a single decision. Make sure that students have gone through STRATEGY with all occupations of interest to them before they make a decision.

5. Do students need more information before reaching a decision? Students may think of STRATEGY as the last step in the decision-making process. This is rarely true. STRATEGY is the last step only if students have collected all necessary information about potential choices before subjecting them to STRATEGY. What happens in practice, however, is that students often select for STRATEGY occupations they have not checked out in COMPARE, PREDICTION, or PLANNING. These occupations often turn out to have the best desirability sums or the best chances for entry. Encourage the students to return to COMPARE for information about these hitherto neglected occupations (especially the values dimensions), and to PREDICTION and PLANNING to see if the occupations are feasible in terms of their educational requirements.

STRATEGY in Relation to the Other Systems

When novices have gone through STRATEGY once, they become initiates. Perhaps some computerized ceremony with fanfares and streamers should be programmed to acknowledge this important event. Instead, all that happens is the presentation of a display telling the students that they are now free to roam through SIGI at will.

SIGI impresses on novices that decision-making is an orderly, sequential process. This approach carries the risk that students may think that a step, once negotiated, has been disposed of forever. They may be too naive to recognize that each step generates feedback referring them to earlier steps. Consequently, the steps are not only sequential, but also circular. STRATEGY, then, is not the last step in a sequence; it represents merely one of a number of things that a person does several times before finally arriving at a decision.

If we may idealize the SIGI decision-making paradigm (and few students will follow this ideal model), we may say that in VALUES novices have come to grips with their wants, and in LOCATE they have identified occupations most likely to satisfy them. If this were the case, students need never return to these systems. (Actually, many students will want to readjust their values and may feel the need to return to LOCATE for a full examination of that system.) Therefore, the systems that are at the disposal of initiates secure in their values and satisfied with the options presented by LOCATE are COMPARE, PREDICTION, PLANNING, and STRATEGY. How are these systems related to one another? What role does each play in the final selection of an occupation?

Figure 30 shows that each system supplies one category of information that contributes to intelligent decision-making. This category is shown under the heading "Question answered." But while a system supplies one category of information, it also implies that additional information in other categories must be assessed before a judgment can be made. This additional information is shown in the four categories under the heading "Questions raised."

Since the decision-making procedure is circular for initiates, they can start anywhere. Suppose they select an occupation in PLANNING, determining whether or not it is feasible with respect to the steps they must undertake to enter it. But an affirmative answer to the question "Is it feasible?" leads to other questions: Is the occupation one that will supply valued satisfactions, sufficient income, and other desired benefits (COMPARE)? Does preparation for it fall within the range of the student's abilities (PREDICTION)? Does the occupation offer sufficient reward at acceptable risks when compared with other occupations (STRATEGY)? Not until adequate information has been obtained from all four systems about each candidate occupation can one make a rational, informed decision.

You should always caution students against interpreting STRATEGY as the last word. Like other systems, it simply supplies a type of information that must be rounded out by other information. It does, however, go beyond other systems in suggesting a method for evaluating options. The final choice is the student's.

USE OF THE PRINTOUTS IN COUNSELING STUDENTS

Values Profile (Figure 8, Chapter IV)

This printout will appear only if students accepted the invitation to readjust their values weights. In the pilot study of SIGI, about two-thirds (20) of the students accepted the invitation, although only four actually made any changes in their weights. The changes were small, consisting of adding or subtracting no more than one point on any value.

If students show you their adjusted profile, find out whether they made any large changes (2 points or more on any value). Small changes may be ignored. Students may want to discuss large changes, since they cast doubt on the stability of the students' values. If the students say they have become more aware of their values since their first session, the changes are probably a good thing. However, if the students seem to be assigning weights at random, you should explain once more the role of values in decision-making. See Chapter IV--VALUES. The subject of stability of values is an important one, and students should be encouraged to reflect on it. Large changes rarely occur over a short interval. But changes do happen as a function of age and circumstance. For example, addition of dependents to one's family, or a surge of unemployment, might make one place more weight on Security. It is useful to remind students of the possibilities of change, and suggest that they try modifying the weights to the extent that they anticipate how their values may change. They will want to see what impact the changes in weights have on desirability sums.

Chart of Desirability Sums (Figure 27)

If students ask about the chart reproduced in figure 27, make sure, first, that they understand the rationale for computing desirability sums as explained above under the heading "Computation of Desirability Sums" (pages IX8-IX11.)Students should recognize the difference between a rating (an expression of what the occupation offers) and a weight (the expression of what the student would like to get). They should also realize that the products of these two, when summed, yields a third measure, the desirability sum, representing the over-all utility of each occupation in respect to the student's ten values weights.

You should also focus students' attention on the values that contributed most to the difference in sums between occupations. Notice that a high weight conjoined to a high rating represents an ideal situation, the prospect that what is desired can be obtained. This delightful outcome is reflected in a high product. On the other hand, a high weight conjoined to a low rating is undesirable, since something desired is not generally attainable in that occupation.

Make sure that students compare the occupations with regard to each value, not just the total desirability sums. For example, in figure 27, the sum for Civil Engineer is 19 points higher than the sum for Mechanical Engineer and 42 points higher than the sum for Electronics Technician. Let us make a table of how these differences came about:

TABLE III

CONTRIBUTION OF EACH VALUE TO DIFFERENCE IN DESIRABILITY SUMS

Value	Wt.	Gain for Civil Engineer Over MecEng	 Over ElcTec
Income	6	0	+12
Prestige	3	+3	+ 3
Independence	5	+5	+10
Help Others	2	+4	+ 4
Security	6	0	0
Variety	4	+4	+ 8
Leadership	4	+8	+12
Interest Field	5	-5	- 5
Leisure	3	0	0
Early Entry	2	0	- 2
		+19	+42

Notice that with respect to the student's two most important values, High Income and Security, Civil Engineer offers no advantage over Mechanical Engineer. However, it does offer more Independence (weighted 5), and more Leadership and Variety (weighted 4). These advantages are counter-balanced to some extent by the 5 points lost because Mechanical Engineer provided a better fit with the student's interest field (Technological). The differences in Prestige and opportunities to Help Others hardly matter, for those values are not particularly important to this student. In evaluating these two occupations, the student should ask himself how important the relatively small gains are in Independence, Variety, and Leadership, or the loss in Interest Field.

The story is different concerning Civil Engineer and Electronics Technician. Electronics Technician loses 12 points on High Income, the student's most important value. It also loses 10 to Independence (weighted 5) and a total of 20 to Variety and Leadership (weighted 4).

The student should certainly look at the actual income figures for these occupations and decide whether or not Electronics Technician offers enough money to meet the student's concept of high income; if it does, the 12-point loss may not matter to this student. But the student must also decide whether or not to accept the diminished opportunities for Independence, Variety, and Leadership. Again, the differences in Prestige, Helping Others, and Early Entry probably do not matter so much because of their low weight.

In general, differences between heavily weighted values are more important than differences between values weighted more lightly.

Basis of Rating for Any Value

The information explaining the basis of an occupation's rating on any value is word for word the same as the answer to the question about that value in COMPARE. In COMPARE, however, the display simply adds to the student's store of factual information with no attempt to evaluate how desirable it may be. The information is analogous to, say, stating that a student got a certain grade in a course without stating whether that grade was good or bad in comparison with other grades.

The same information in STRATEGY is a verbalization of the occupation's rating on the value in question. Now a judgment is imposed on the information, in the sense that such words as "A great amount" mean the highest rating (4 for most values). The words are now like the comment "Excellent" that a teacher might write on a term paper graded A.

Students should realize that the ratings, whether verbal or the numerical equivalent, are not assigned whimsically. The SIGI research staff determined the ratings by, first, establishing definitions for each category of rating. They then examined all available information about the occupation to determine which category it fitted. Their decisions were checked by active workers in the occupations. The ratings--words or numbers--are more stable than one might expect.

The Occupational Overview (Figure 20)

An occupational overview display in STRATEGY is exactly the same as the overview display for the same occupation in PLANNING. (The display appears in PLANNING regardles of whether or not your college has a complete Planning system with local data.) The purpose of the display, however, is different in the two systems. In PLANNING, the overview provides information enabling students to decide whether an occupation is feasible for them to enter. In STRATEGY, it enumerates the steps that must be accomplished for entry, each step attended by its own probability of success.

The display, therefore, should be used to assist students in arriving at an estimate of their chances of entering an occupation. Follow the suggestions set forth earlier under the heading "Estimation of Probabilities of Entering Occupations" (pages IX-15--IX-21).

Chart Showing Desirability Sums and Chances (Figure 28)

Examining the student's estimates. This is the only display that shows the student's estimates of the probability of successfully entering the three occupations. Examine the estimates in the light of what you know about the student's abilities and the requirements for entry into the occupations. This is a tough thing to do, for you do not have much factual information to go on and students may interpret any disagreement with their estimates as personal criticism. The suggestions presented earlier under the heading "Estimation of Probabilities of Entering Occupations" (pages IX-15--IX-21) may be helpful.

Discussing the display. After students have seen the desirability sums for their three occupations and have made their probability estimates, they designate which of the three they would prefer at the moment. For convenience, let us call their choice GEM.

The computer now compares both the desirability sum and probability estimate of GEM with the corresponding features of the other two occupations. Six possible outcomes may occur, each with a different display:

1. GEM has the best desirability sum (or comes within ten points of the best) and also the best chances. The student is told that under Rule 2 of the strategy, GEM is the best choice of this set of three. No discussion should be necessary, unless the student went through STRATEGY with more than one set of occupations.

2. GEM has the best desirability sum (or comes within ten points of the best), but it does not have the best chances. The student is asked whether the increased reward is worth the added risk. Follow the general guidelines previously discussed under the heading "Rules for a strategy of rewards and risks" (pages IX-24--IX-28). If the difference between risks is small and the estimates seem realistic, the student might as well base his decision on desirability alone.

3. GEM does not have the best desirability sum nor is it within ten points of the best, but it has the least risk. The students are asked whether the increased safety is worth the diminished reward. In your discussion, again follow the guidelines under "Rules for a strategy of rewards and risks." If the desirability sums are fairly close and the students have no strong preference for a particular occupation, they may be encouraged to consider the occupation easiest to enter, Make sure, however, that the students have really explored the values dimensions of the candidate occupations.

4. GEM has neither the highest desirability sum nor the least risk. This is the toughest situation, since the "best" occupation may be neither the most desirable nor the most safe. Follow the guidelines under "Rules for a strategy of rewards and risks." Make particularly sure that students are aware of the need to base their decision upon full information from all systems, not just the information in STRATEGY. Often the best thing to do is to urge students to go back to COMPARE for a deeper exploration of the occupations before deciding.

5. All the estimates are the same, and GEM has the best desirability sum or is within ten points of the best. Students are told that, since their estimates are identical, they are correct in basing their choice on the magnitude of the desirability sum. No discussion should be necessary, provided that the estimates are fairly reasonable.

6. All the estimates are the same, but GEM does not have the best desirability sum nor is it within ten points of the best. Students are told that their choice is not the best in light of the information contained in the display. In your discussion, ask why the students chose

GEM. Some value may be at work that does not contribute to the desirability sum. In an earlier chapter, Funeral Director was cited as an example of an occupation that apparently rates high on many cherished values but that students nevertheless reject because it does not satisfy other values (perhaps ones that students are not conscious of) not considered by SIGI. Rejection of an occupation for such reasons is valid. But if students seem to be rejecting occupations irrationally, you should point out the inconsistency in their behavior. Some underlying emotional problem or misunderstanding may be the cause.

Explanation of Use of PREDICTION (Figure 29)

This display will not appear if your SIGI lacks a Prediction system. The display is self-explanatory. Nevertheless, students may want to know why they have to go to two other systems to get the prediction information. Why does the computer simply not display it in STRATEGY?

The answer is purely technological. SIGI resides on two magnetic discs or computer storage devices. One disc contains all of VALUES, LOCATE, COMPARE, the part of PLANNING that is the same for all colleges, and STRATEGY. This disc is the same for all colleges that use SIGI. The second disc contains all of PREDICTION and the part of PLANNING that is unique to the local college--the program of study displays, prerequisites displays, and so forth. Transferring from disc to disc, as would be required if information from PLANNING and PREDICTION were to appear in STRATEGY, causes intolerable delays in response time. Therefore, students must complete their interaction in STRATEGY before getting the supplemental information from the other disc containing PLANNING and PREDICTION.

Names of Programs for PREDICTION (Figure 21)

This display comes from the PLANNING system. If students bring it to you, it means that they have followed the suggestion to identify programs to ask about in PREDICTION. See Chapter VIII--PLANNING--for the discussion under the heading "List of Suitable Curricula" (pages VIII-11--VIII-13).

Check to see whether or not students have a display for each occupation they selected for STRATEGY. In the Planning system, they consider only one occupation at a time, whereas in STRATEGY they consider them in sets of three. If they want to use PREDICTION to check their estimate for one of the occupations, you would expect them also to check on the other two.

Prediction Chart (Figure 16)

This chart comes from the Prediction system. If students bring it with them after interacting in STRATEGY, it means that they have followed through on the suggestion to use PREDICTION to evaluate their estimates of probability of entering their occupations.

For a general discussion of the display, see Chapter VII--PREDICTION--under the heading "Use in Conjunction With the Strategy System" (page VII-16).

It is difficult to tell what the correlation should be between a key course prediction and the probability of entering an occupation. If the key course is more or less representative of all the activities that prepare one for the occupation, the correlation may be fairly high. For example, a course in drafting is probably representative of the activities a person would engage in to become a draftsman, and the prediction for the course should correlate well with the probability of entering the occupation. If, on the other hand, numerous activities must be undertaken that the key course does not represent, the correlation would be less high and the prediction would not be so useful in making the estimate.

Since several different steps are involved in preparing for an occupation, the probability of completing all of them will be less than the probability of completing any one of them. Therefore, the probability of entering the occupation should be less than the probability of successfully completing the key course. Remember that "successful completion" of a course may mean earning a grade of B or better in some cases.

HELPING STUDENTS USE STRATEGY

If it seems advisable to discuss STRATEGY at a terminal and one is free, sign on with any DEMO number not in use. Set status at 7 (initiate) in order to use the system as selectively as possible.

The path you take through STRATEGY will depend on the needs of the student you are counseling. The following paragraphs list the points in the program where you have a choice of paths.

Choice Points

First display. The first display in STRATEGY asks whether or not you want to see the rationale behind the determination of the desirability sums. If you say yes, you repeat the sequence explaining how the Logic family used value weights and automobile ratings in order to select a car for each of the three members of the family. Choose this path if the student does not understand the difference between a weight and a rating or the reason for multiplying the two quantities.

If you say no, the computer skips the ratiocinations of the Logics.

Review of value weights. You will next be asked if you wish to review your value weights. The first time you go through with a student, you must say yes in order to substitute the student's weights for the dummy weights connected with a DEMO number. You will also be asked if you wish to select an interest field. Accept this option, too, so that the student's chosen field will be used when the computer retrieves an occupation's rating on Interest Field.

Selection of occupations. You will be asked if you wish to select the occupations for STRATEGY from the "Reminder List." Say no, since the occupations displayed for a DEMO number are arbitrary. Select the three occupations from the SIGI bank.

Computation of desirability sums. You will be asked if you wish to work out the desirability sums one value at a time or go directly to the sum as finally computed without the option of seeing how each value contributed to it. If you work out the sum step by step, you will see the rating for each occupation on each value, will have the opportunity to call for information that explains the ratings (the values questions from COMPARE), and will be able to see which values were responsible for the differences in the sums.

All of this information will be lost if you go directly to the display of the sums. The choice depends, of course, on the needs of the student. If he already has sufficient information about the occupations and is interested only in the outcome of the computation, skip the step-by-step method. If he is not completely familiar with the occupations or with the method for computing the sums, the slower route may be helpful.

Displays explaining a strategy. After the desirability sums have been displayed and compared, you will be asked whether or not you want to see a sequence explaining a strategy based on rewards and risks. If you say yes, you see the displays setting forth Rules 1 and 2 and discussing the relationship between rewards and risks. If you say no, you go directly to estimating the probabilities of successfully entering the three occupations. The choice depends on the needs of the student.

Using the prediction system. If your version of SIGI has a Prediction system, you will be asked if you want instructions for using that system as a help in evaluating your estimates. A yes response generates the display illustrated in figure 29. Say no to the question about seeing it, for you already know what it says.

Making Estimates

We speculate that a student wanting help at the terminal will need most assistance in making estimates of chances of entry into the occupations. Follow the suggestions previously discussed.

Use of PREDICTION

Since you have signed on as an initiate, you can enter the Prediction system to help evaluate your estimates. Go first to PLANNING to find out which programs to ask about. Select one of the occupations used in STRATEGY and stick with it until you get the printout of the local program recommended for it (figure 21). Then abandon that occupation as soon as the computer will permit and repeat the process with the second occupation. When you know the programs for all three occupations, go to PREDICTION and ask about them.

This process may seem tedious, for you are forced to get many printouts along the way and the printer is not very fast. At present there is no way out of this difficulty.

VALUE	WT.	OCCUPATION		
		MecEng	CivEng	ElcTec
(1) Income	6	4 24	4 24	2 12
(2) Prestige	3	3 09	4 12	3 09
(3) Independence	5	3 15	4 20	2 10
(4) Help Others	2	1 02	3 06	1 02
(5) Security	6	3 18	3 18	3 18
(6) Variety	4	3 12	4 16	2 08
(7) Leadership	4	2 08	4 16	1 04
(8) Interest Field	5	4 20	3 15	4 20
(9) Leisure	3	3 09	3 09	3 09
(0) Early Entry	2	2 04	2 04	3 06
		---	---	---
		Sum = 121	140	98

Your weight for Income (6) X the rating of MecEng on Income (4) = 24, etc.

The sum of the products appears at the bottom of each column
The occupation with the highest sum is probably the one that would fit your values best. The highest possible sum is 168; the lowest is 40.
In general, a difference of 10 points or more between sums is significant.

You will want a copy of this chart. Press PRINT.

FIGURE 27

Chart showing derivation of desirability sums. Weights measure what the student wants on each value. A rating (the one-digit figures under each occupation) measures what the occupation offers on that value. The products combine these two factors. The sums measure the desirability of the occupation across all ten values.

```
              OCCUPATIONS                     DESIRABILITY SUMS    CHANCES
160 Mechanical Engineer                             121              50
124 Civil Engineer                                  140              40
138 Electronics Technician                           98              75

     You have chosen 124 Civil Engineer.

     This occupation has the highest Desirability Sum or comes within ten points
of the highest.

     According to your estimate, however, it does not offer the most chances
for getting into it.

     Thus, in choosing this occupation, you have decided that the higher reward
it offers is worth the extra risk of going after it.

     That is a perfectly reasonable choice, provided that the risks are not so
bad that you should reject this occupation under Rule 1 of your strategy.

     For a copy of this display, press PRINT.  Otherwise press NEXT.
```

FIGURE 28

Chart showing desirability sums and chances, and discussing them in terms of rewards and risks. Different displays appear depending on whether the student picked as his first choice the occupation with the highest desirability sum, the best chances, both, or neither.

OCCUPATIONS	DESIRABILITY SUMS	CHANCES
160 Mechanical Engineer	121	50
124 Civil Engineer	140	40
138 Electronics Technician	98	75

Go to the PLANNING system first. Ask for the occupation you want predicted.

When you see the plans for the occupation, you will get the name(s) of the program(s) to ask about.

Make sure you stay in the Planning system long enough for this information to appear.

When you have the names of the programs of study for all the occupations you are interested in, go to the PREDICTION system and ask about them.

You will want to take this information with you. Press PRINT.

FIGURE 29

Instructions for using the Prediction system in order to obtain key course predictions for judging the reasonableness of estimates. If the local version of SIGI lacks a Prediction system, this display is replaced by another telling the student to seek the help of a counselor for judging the estimates.

System	Question answered	Questions raised COMPARE	PREDICTION	PLANNING	STRATEGY
COMPARE	Does it offer what I want?		Can I make it?	Is it feasible?	How does it stack up with other options?
PREDICTION	Can I make it?	Does it offer what I want?		Is it feasible?	How does it stack up with other options?
PLANNING	Is it feasible?	Does it offer what I want?	Can I make it?		How does it stack up with other options?
STRATEGY	How does it stack up with other options?	Does it offer what I want?	Can I make it?	Is it feasible?	

FIGURE 30

The relationship between STRATEGY and other systems supplying occupational information. Although each system answers one category of question, it raises other questions that are answered by other systems. Students need all relevant answers from all four systems to choose wisely.

CHAPTER X

USING THE SIGI MODEL IN OTHER CONTEXTS

One of the introductory displays in SIGI says, "Give a man a fish, and he has a meal. Teach him how to fish, and he will have meals for a lifetime." In choosing between dispensing fish and teaching fishing, SIGI has clearly chosen the latter. We would, of course, be pleased if students caught an occupation while they were learning, or at least got a bite, but we do not insist on that outcome. We expect that students will fish the waters of career decision more than once in their lives, and our aim is to equip them with rod and reel and a sure hand in using them.

But our aim goes beyond that. Life involves many kinds of decisions, and we would like our methods to apply to them all. Can the SIGI model for decision-making be detached from the computer with its ordered program and convenient storehouse of information? Can it be applied to other decisions than choice of career?

We believe that the answer to these questions is yes. This chapter will discuss the theoretical model on which SIGI is based and will show how that model applies to a wide variety of decisions.

THE DECISION-MAKING MODEL

The Decision-Maker (DM)

We may conceptualize the decision-maker (the DM for convenience) as bringing to the decision numerous values, abilities, and resources. A value is any satisfaction or reward that the DM hopes to secure or control through the decision--prestige in an occupation, good gas mileage in a car, protection from flooding in a house. An ability is a physical or mental power to do something--to solve mathematical problems, draft a diagram, paint a portrait. And a resource is a supply that the DM can draw on--money, time, energy, perseverance.

Figure 31 illustrates this conceptualization. Since the values vary in importance to the DM, and since the DM's abilities and resources also vary, the bars representing them vary in height. The scale is purely arbitrary; an eight-point scale was used because 8 is the maximum weight that a student can give a value in SIGI. The number of values, abilities, and resources drawn in the figure is also arbitrary. You could think of hundreds of different values or abilities a person might have, or of innumerable resources at his command.

The Option

The option is a thing that can be chosen. We may conceptualize an option as the counterpart of a DM. Where the DM has values that he hopes to satisfy, the option provides varying degrees of opportunity to satisfy them. Where the DM possesses certain abilities, the option requires certain powers to attain entry or success. And where the DM commands certain resources, the option requires certain expenditures in its pursuit.

We will call these dimensions satisfactions (the counterpart of values), requirements (counterpart of abilities), and manageability (counterpart of resources). We may imagine that the components of each dimension exist in varying degrees, just as values, abilities, and resources vary in the DM, and that no two options are exactly alike in what they offer or require. For example, each car being considered by a buyer will vary in its gas mileage, cost, repair record, handling characteristics, and so on.

Relationship Between DM and the Options

Figure 32 carries this conceptualization a step further by bringing a DM and an option into juxtaposition. You can imagine other options under consideration that more or less resemble the one at the top of the figure, but differ in the placement and length of the bars.

It will be noticed that the DM possesses more values than the option offers by way of satisfactions. This, of course, merely acknowledges the fact that only a few of a DM's whole array of values are actuated in any one decision. When you buy a ballpoint pen, you do not think about your fondness for string quartets, good gas mileage, or vitamin D. Similarly, a DM has more abilities and resources than the option demands, although, unfortunately, the DM may not have the right ones.

So too with the option. It may offer satisfactions that the DM does not care about because the corresponding values are of no importance to him. Two ballpoints pens may differ slightly in length, in the manner of retracting the point, and in the placement of the pocket clips; but these satisfactions happen to mean nothing to some persons, and they ignore them in their choice.

Only the values that the DM deems relevant to the decision at hand are considered in the decision. In figure 32 the bars for four values have been darkened and identified with a V to indicate that they are the subset of the total array of values that the DM will invoke in this decision. The satisfactions in the option that correspond to these four values have likewise been darkened. The dashed arrows that lead from the values to the satisfactions indicate that the set of satisfactions that figure in the decision is determined by the set of values that the DM invokes for it.

There is a one-to-one correspondence here. If you value prestige, look for prestigious occupations. If you value economy in cars, look for economical models. Other satisfactions, although they exist in the options, do not count in this decision of this decision-maker.

The situation is different with regard to the other dimensions. It is the requirements and manageability of the option that determine the abilities and resources to be sought in the DM. If you wish to become a statistician, you had better have ability in math; if you wish to buy a Mercedes 450SEL, you must find among your resources a way to finance it. In figure 32 the darkened bars and the direction of the dashed arrows show the relationship between these dimensions.

Objective of the Decision

With figure 32 in mind, we are in a position to examine the objective of the decision: The aim of the decision is to select the option that is most likely to maximize the DM's values, that lies within the range of the DM's abilities, and that is manageable in terms of the DM's resources.

The Model for Making the Decision

How shall we construct a model of the steps a DM should take to reach this objective? Unfortunately, SIGI itself will not serve well enough because so many elements of the process have been previously worked out for students and stored in the computer memory and program. SIGI is not the model, but is an adaptation of it.

In order to divorce the model from SIGI, we may conceptualize the process of decision-making in the flow chart reproduced in figure 33. Although at first glance the chart may look like an abstract etching by a particularly untalented art student, it is really quite simple because it has so few branches. The rectangular boxes signify steps on which the DM does something--collects information or computes desirability sums. The diamond boxes indicate steps where the DM makes a judgment as to which of two procedures to follow: to estimate the probabilities or not to estimate them, to eliminate options or not to eliminate them.

With these simple distinctions in mind, you can trace through the chart with reference to the following description.

Box 1. The DMs identify the subset of their values that are relevant to the decision. They weight them and adjust the weights just as was done on SIGI. This step corresponds to the Values system.

Box 2. If the decision involves only a limited number of known options (Which of two courses should you take? Which necktie in the store should you buy?), the DM goes to box 4; otherwise, to box 3. There is nothing corresponding to box 2 in SIGI, where many potential options always exist.

Box 3. Using a net composed of two or three important values, the DM strains out a provisional set of options that are likely to satisfy his values. This operation is the LOCATE step of SIGI.

Box 4. The DM collects information about all dimensions of the candidate options. In SIGI this part of the process has already been done off line by experts. The results are stored in COMPARE, PREDICTION, and PLANNING.

Boxes 5 and 6. The information-gathering may reveal that some options are clearly unfitted to the DM's values. If so they may be eliminated in box 6; if not, the DM proceeds directly to box 7. This operation is like inquiring about occupations in COMPARE and weeding out the clearly unsatisfactory ones.

Boxes 7 and 8. The information-gathering may also reveal that some options are impossible to attain (e.g., a scholarship awarded only to a member of the opposite sex). These options may also be eliminated. This action resembles the SIGI Prediction system.

Steps 9 and 10. The information-gathering may reveal that some options are unmanageable in terms of the DM's resources (they cost too much, take too much time, demand too much energy). Such options may also be eliminated. This step is somewhat like the SIGI Planning system.

Step 11. The DM now rates or "grades" the remaining options on each of the values weighted in box 1. In SIGI the rating is done off line by experts and the results are stored in the computer memory.

Steps 12 and 13. If attaining each of the options under consideration is a dead certainty (choosing between courses for which I am qualified, going to sleep versus watching the late show), the DM goes to box 14. If there is some doubt, the DM estimates the probability of attaining each option. In SIGI it is assumed that entry into any occupation, no matter what, is attended with some degree of uncertainty, and the probability estimate is never bypassed. The estimation in SIGI takes place partly in PREDICTION and partly in STRATEGY.

Step 14. The DM computes the desirability sums of the remaining options. This is exactly like the similar computation in STRATEGY, except that the DM must do his own arithmetic.

Steps 15 through 21. The DM assesses the result of the computation. If the probabilities are about equal or are a dead certainty, the DM might as well base his decision on the desirability sums (boxes 15 and 16.) If the probabilities are unequal but not the sums, he might as well base his decision on the probabilities (boxes 17 and 18). If any option has the highest sum and also the highest probability, it is a likely winner (boxes 19 and 20). Otherwise the DM must assess the rewards and risks of each option (boxes 19 and 21). This procedure corresponds to what the computer does in selecting displays in STRATEGY; sums and probabilities are compared and different displays are chosen depending on the outcome of the comparison.

Box 22. The preliminary decision is reviewed. This step is implicit in SIGI.

Box 23. The DM formulates contingency plans in case the primary decision does not work out. This step is also only implicit in SIGI.

Flexibility. The flow chart does not indicate an essential element in the model, flexibility. Real life refuses to follow flow charts. You may imagine that the information collection represented by box 4 may actually extend over the whole process, that step 3 might be repeated several times with different values, that the smooth flow from box to box is actually a disorderly skipping around, and that many of the steps may have to be done more than once. But the general features of the model are always the same: The flow always proceeds from the DM's values, and its course is determined by the need for information.

THE VALUES STEP

The model begins, first, with the identification of a set of values that the DM deems relevant to the decision and, second, with a weighting of those values in accordance with their importance. In SIGI a set of ten values relevant to occupational choice have already been identified. The set is not exhaustive, but if the DM wishes to weight other values, he has to do so off line because of the limitations of the computer program. Therefore SIGI does not provide a model for identifying relevant values.

This all-important step in the decision-making process has to be started from scratch.

Identifying Relevant Values

Simple decisions. In simple situations, relevant values are merely those that the DM would like to have satisfied as a result of the decision. For example, in ordering an entree in a restaurant, you need only examine the menu and determine which offering strikes you as most satisfying at the moment. Your value is your personal taste. If you are on a reducing diet, another value appears, caloric content of the food. If you are allergic to certain substances, yet another value is added to the list, the absence of allergens. If in addition you care that your diet be balanced, you include nutrition as one of the values.

Each of these sets of relevant values has the following elements in common:

1. The values are the ones that the DM would like to control in the decision. He would like to maximize his chances of being satisfied (maximum stimulation of the taste buds, maximum nutrition) or minimize his chances of being harmed or displeased (freedom from allergens).

2. The values are all ones that the DM expects to be satisfied, to one degree or another, by means of the options. They are "relevant" to the situation. For example, you might think that Helping Others is an important value, but it is obviously inappropriate for selecting an entree from the menu. However, taste, caloric content, and so forth are clearly

relevant to the situation.

3. The values differentiate the options. For instance, one of your important values may be the service of food on a clean plate accompanied by clean silverware, but you expect all your options to satisfy this value to the same degree, and so you do not include it in your set. On the other hand, you do expect foods to differ in taste, calories, absence of allergens, and nutritive quality, and so you do include any of these values that you want to control by means of the decision.

Complex decisions. In a complex situation that involves many values, identifying the relevant ones may be difficult for an inexperienced person. One can then say to the DM, begin as you did with the simple decision by listing the values that you would like to satisfy or control through the decision.

Your personal inventory will not include values that you have overlooked because of your inexperience. One way to discover these values is by reading. Many important decisions occur so frequently that books and articles have been written about them. These publications are good places to discover values that you should throw into the decision pot. For example, much has been written about choosing a college, buying a house, buying various consumer products like automobiles and appliances, investing in the stock market, marrying, rearing children, improving your sex life, becoming liberated, and a host of other critical concerns in our extraordinary culture. Even when the printed advice is bad, it often reveals important values that you should not overlook.

Another source of information is the personal experience of people who have faced your decision. What, in retrospect, do they think was important? What values do they wish they had considered that they failed to consider? Did they use some values that did not help in the decision?

A third place to look is in the information you will be collecting about your options. For example, if you are a high school senior pondering which colleges to apply to, you will probably be scanning catalogs hoping for inspiration. As you read, list items of information that you would like your decision to entertain. A catalog may mention small classes, personal contact with faculty, accessibility to cultural events, parietal rules, counselor services, number of Ph.D.'s on the faculty, access to skiing, and so on. Add to your list any values that seem important.

Pruning the list. One can then explain to the DM, when you have listed all your discoveries, check each value to see that it meets three conditions: (1) It should be relevant to the decision, (2) should discriminate between options, and (3) should be clear enough in your mind that you can recognize opportunities to satisfy it when they occur in the options.

Some of the values on a student's list, especially those generated from his hopes and expectations, may fail the test of relevance. Probably every counselor has seen students who want to do things for the "wrong" reason. They want to take a course in order to enjoy the companionship of a friend, or they skip a final examination because their car needs tuning. There are better and more appropriate ways of satisfying such values. The fault does not lie in the values, but in applying the values to inappropriate options. The values of friendship and a well-tuned car may be maintained for other decisions, but should be dropped from the list of values used in choosing a course or deciding whether to take a final examination.

Some values may fail to differentiate between the options. For example, in choosing a college a high school student might include as a value the opportunity to study biology. But all colleges offer biology, and so the student's value is not helpful in discriminating among the options. If, however, the student's value is to study marine biology, the value would then discriminate among colleges because few of them offer majors in that field. Similarly, if you were buying a house in an established suburban community, you might find that access to utilities was a value that all options satisfied to the same degree. But if you were thinking about real estate in the Arizona desert, access to utilities might be an important value. Some lots might satisfy it and others might not.

Finally, all the values on the list should be usable in the sense that you can define them sufficiently well to recognize instances of their occurrence when you see them. The values that are useful in decision-making have real-life referents, and students who want, say, to go to an inexpensive college must be able to define inexpensive with regard to their own pocketbooks and then must be able to apply the definition to the colleges they are contemplating.

Helping students define values. When we were interviewing students in the development stage of SIGI, we encountered hundreds of examples of values that were too ill defined for decision-making. How can a counselor help students articulate their values in a usable form?

We suggest, first, that you refrain from asking leading questions until you know what the student has in mind. Get him to tell you. If a student says, "I want to be my own boss," you might reasonably think he is talking about the value independence. But you may be wrong; he may have in mind a value more like prestige. Therefore do not lead him by asking, "Do you mean you want to be independent of supervision?" Simply ask him to be more explicit: "What do you mean by 'being your own boss'? Give me an example of a situation that would satisfy you and one that would not." Leading questions are likely to put new ideas in the students' minds and divert them from their true feelings.

Second, we suggest that you make no assumptions about the students' attitude toward any value. For instance, many of our subjects named responsibility as one of their occupational values. Our probing revealed that some students meant responsibility for large endeavors, such as administration of a Government agency; others meant supervision of a few coworkers; and yet others meant freedom from responsibility.

Third, we have had fairly good luck in helping students clarify fuzzy notions by asking for examples of what they meant by "interesting work," "working with people," or "being their own bosses." More specifically, we have asked them to describe what they would be doing while performing "interesting work" or "being their own bosses." Answering such questions forces students to become concrete and specific.

Weighting the Values

The values must be weighted to show their importance to the DM.

First the values are weighted one at a time to show the importance of each value considered by itself. Second, the weights are adjusted to show the importance of the values in relation to one another.

First weighting. Any scale can be used for weighting values. In this discussion we will use the eight-point scale employed by SIGI. (See figure 9, chapter IV.) The scale runs from 0, indicating no importance, to 8, indicating highest importance. The midpoint, 4, shows medium importance. Since all the values are, by definition, desirable, negative numbers are not used. If the DM wants a value that is the opposite to one of the listed values, he should include the reverse value on his list and assign it a positive weight. For example, if a student does not want to be burdened with responsibility in an occupation, he should use its opposite, freedom from responsibility.

The weight assigned to the value is the answer to the question, "How important is this value to you?" If the answer is, "Very important," the weight assigned should be 7 or 8. The number indicating the weight is merely a numerical equivalent of the answer to the question, "How important?"

It is unprofitable to agonize over fine distinctions at this point, for the relative weights rather than the absolute weights determine the direction of the decision.

Adjusting the weights. When the values have been weighted individually, the weights must be adjusted to show the importance of the values in relation to one another. Relative weights are necessary in order to establish priorities among the values so that a more important value will not be sacrificed in order to satisfy a lesser rival. Moreover, relative value weights, not absolute ones, must be used in estimating the over-all desirability of the options.

Relative weights can be obtained through a long series of paired comparisons or--less tediously--through distribution of a fixed sum, as in SIGI. The easiest way to force the adjustment is to decree as in SIGI, that the weights must be distributed so that they sum to an amount equal to the midpoint on the scale multiplied by the number of values that are weighted. That is, for our eight-point scale the weights should add to 4 times N where N is the number of values used in the decision. Since ten values are used in SIGI, students are forced to distribute their value weights so as to sum to 4 x 10 or 40. If twelve values enter into the decision the sum would equal 4 x 12 or 48. This system is convenient because using the midpoint of the scale allows room to adjust the values up or down in reaching the required sum.

This final weighting should not be hurried, for some difficult judgments have to be made. When a DM reduces the weight of value A from, say, 7 to 6, he may find that value A is now on a par with values B and C. Are the values of the same importance to him? He must make the adjustments so that three ends are achieved simultaneously. (1) The most important values must have the greatest weight, (2) the least important value must have the least weight, and (3) the sum must equal 4 x N.

Notice that in the adjustment process the absolute weight assigned to the value is not so important as the relative weight. It really makes no difference whether a DM's most important value is finally given a weight of 8 (greatest importance) or 6 (strong importance), as long as it is given more weight than the values of less importance. Some persons become troubled when they reduce the weight of a value in order to approach the required sum. They think they are no longer reflecting the truth about the importance of the value to them. They do not want to call it medium when their feelings about it are strong. However, if the final adjusted weights are proportional to the DM's feelings, the actual numerical weights make no difference. The most nearly satisfactory option will still get the highest desirability sum, and the rank order of the values will still serve as a guide in locating options and investigating them.

Values Appropriate for Decisions About Jobs

It may be useful here to distinguish between a position, a job, an occupation, and a career. A position is the place that you are hired to fill when you become employed. There is a position for each person working--one person, one position. You have a position as counselor at Nirvana Community College.

A job is a group of similar positions in a single plant, business establishment, industrial institution, or other organization. Several persons in the same establishment may have the same job. You and the other counselors at Nirvana have more or less the same job.

An occupation is a group of similar jobs found in various establishments. In the United States, the occupation of counselor can be distinguished from the occupation of teacher.

A career is a succession of positions, jobs, or occupations that one person engages in during his lifetime. Your career may have included the occupations of teaching assistant, psychology teacher, and counselor.

Notice that the arrangement is hierarchical. A career may embrace several different occupations, each of which includes numerous jobs performed by persons in various positions.

What values should a DM take into account in making decisions about jobs? Obviously there is some overlap with occupational values, and the ten SIGI values are therefore helpful. (The values are high income, prestige, independence, helping others, security, leadership/responsibility, variety, interest field, leisure, and early entry. They are defined in chapter IV.)

There are, however, many values that differentiate jobs but not occupations. Since jobs are defined to some extent by the establishments where they take place, decisions about them involve factors that decisions about occupations need not consider: the kind and number of coworkers, working conditions, commute time, parking facilities, sex and ethnic discrimination, and many others. For example, working with congenial people may be an important value to some DMs, but the personality of one's coworkers is a characteristic of a particular job rather than of an occupation as a whole. In decisions about jobs the DM still faces the task of identifying values that are relevant to the decision, that differentiate the options, and that are usable.

The following list is merely advisory. It consists of the values named by interview subjects in discussions about their decisions. Many of your students may have other concerns in mind that are legitimate values, and some of the values in the list below may be wildly inappropriate for some decisions or some DMs.

The ten SIGI values
Fringe benefits
Availability of parking
Proximity to home
Congeniality of coworkers
Work alone or in group
Safety
Dress code

Size of organization
Surroundings
Cleanliness
Geographical location
Availability of transportation
Promotion/advancement
Hours } related to the SIGI value,
Overtime } leisure, but sometimes expressed in narrower terms.

NEED FOR INFORMATION

The remaining steps in the decision-making process all require information about the options. Information may come from many places--reference books, directories, catalogs, compilations, indexes, bibliographies, Federal Government reports, Congressional hearings, periodicals, the Yellow Pages, classified ads, encyclopedias, people, and elsewhere. The source in any particular decision depends partly on the nature of the decision and partly on the ingenuity and thoroughness of the DM. But whatever the source, information must be available for a rational decision to take place. Therefore locating information is an essential part of any decision-making method that aspires to be more than a lottery or a psychic event.

Unfortunately, the subject of information gathering is beyond the scope of this handbook. It is clearly impossible to discuss all likely sources of information for every conceivable situation. Usually, the nature of the decision will suggest where to look for information. For instance, information about jobs may come from placement services, employment agencies, prospective employers, want ads, bulletin boards, responses to letters of inquiry, and acquaintances. Counselors, teachers, and reference librarians may have to help inexperienced DMs in their search for information.

In the following sections of this chapter we will simply assume that necessary information is available to the DMs or that they know where and how to get it.

IDENTIFYING A WORKABLE SET OF OPTIONS

The second step in the decision-making model is to identify a set of options. This step corresponds to box 3 in figure 33.

Between steps 1 and 2 the DM makes a judgment (box 2) as to whether a suitable set already exists. If the decision is an either/or, go/no go kind or if it involves only a small number of known options, the set is a given, and the DM goes directly to collecting and evaluating information about its members. But if many options exist, as in occupational choice (there are many thousands of occupations listed in the Dictionary of Occupational Titles and over 800 occupations named in the Occupational Outlook Handbook), some principle must be invoked for reducing the number to a workable size without losing the best prospects.

The principle is to use the DM's most important values for netting those options that seem likely to satisfy them. The operation of the principle may be seen in the LOCATE system of SIGI. The procedure is very quick compared with the amount of time that would be required to explore the whole array of options in any depth.

Selecting Values for the Search

DMs begin by selecting a set of search values from the group that were weighted in the previous step. SIGI uses five values for this purpose, but five are too many to keep track of without a computer. If the DM must manage values by hand, two or three dimensions are probably enough; for some decisions one may be sufficient.

The values selected should be those that the DMs most want to see realized in their decision. They are the values that the DMs would not want to give up under any circumstances.

Making Specifications for Each Search Value

The next task is to make a specification for each of the search values. The purpose of the specification is to enable DMs to recognize when an option provides acceptable opportunity to satisfy the value.

Generally speaking, a specification should be explicit in order to be useful. It may be a minimum quantity (salary, cost, measurable performance, size, etc.); a defined category (style, color, model, location, etc.); or, less desirable, a reference to some standard recognizable to the DMs (a great amount, more than average, etc.). Many of the specifications in SIGI are in this latter form, but the terms more than average, a great amount, and such have been operationally defined so that they are equivalent to quantities or categories. The computer knows what they mean.

Some persons find it difficult to be explicit about what they want. They say they can recognize it when they see it. For such persons--provided that they are not kidding themselves--vague terms like interesting, good, sexy may be specification enough. The purpose of the specification is to guide the examination of the information, not to communicate to someone else. If a DM, examining two options, is able to say, "This one is sexy with respect to my value and that one is not," it is hard to argue that sexy is inadequate specification.

Skimming the Information

The next task is to skim the information about each potential option to find the portions of it that concern the search values. These items of information are then examined with sufficient care to see whether or not the option meets the specification for the value. All other information is ignored at this time.

The skimming step is mostly a go/no go operation. If an option comes up to the level specified for each of the search values, it is a candidate for the final decision. If it does not, it is pursued no further.

Skimming requires special skills that are usually taught in how-to-study and reading improvement courses. Knowing how to skim is important in the decision-making process. If your students have not acquired the skill, you should refer them to an appropriate book or study skills class.

Some DMs may be concerned that the all-or-nothing methods of the LOCATE procedure may eliminate options that might, in the end, be the best choice. This result is unlikely if the search values are distinctly more important to the DMs than the values not used in the search. If important values were left out, DMs can conduct the search in two stages, each with a different set of values. The options that survive both searches are the ones likely to be most satisfactory. DMs can also establish a "doubtful" category for those options that do not meet all specifications but which the DMs do not want to lose forever.

Using the Model in Information Gathering

In some situations, all or much of the necessary information is conveniently collected in one place. Examples are The Occupational Outlook Handbook and SIGI for information about occupations or The College Handbook for information about colleges.

In other situations the information is scattered, and the DM has to collect a dossier on each option. Examples are information about houses a DM might buy and jobs he might take.

It would be wasteful to collect all possible information about all possible options, only to eliminate most of them later by applying the search values. Therefore DMs should combine the skimming operation with the information gathering. They collect only enough information about an option to judge whether or not it passes through the net of search values. If the option meets the test, gathering information about it will continue; if it fails, no more effort will be wasted in investigating it.

This principle of using the decision-making algorithm as a guide to information gathering should be applied whenever possible. For instance, with reference to figure 33, an item of information might be uncovered indicating that an option was impossible to attain (boxes 7 and 8 on the flow chart). That option would then be abandoned immediately. In effect, the steps in the decision-making process are applied to information gathering as well as information processing.

Search Values in Decisions about Jobs

The search values for decisions about jobs may differ under different conditions. In good times DMs should use their most important two or three values as explained above. For part-time jobs, however, or job-hunting from hunger, they may have to use whatever values are available in the options instead of those most desired. Even low-weighted values vary in their importance to the DM, and he can use the best of them to identify the most desirable among undesirable options.

In hard times the "LOCATE" step may not enter into the decision at all. The options may be so few that DMs do not have the luxury of reducing their number to a manageable size.

INFORMATION PROCESSING--COMPARE

In SIGI information processing is spread over four systems. COMPARE gives factual information, PREDICTION gives information about the requirements of options, PLANNING gives information about their manageability, and STRATEGY gives information about how the occupations compare in their desirability.

On the computer it is useful to keep these classes of information in separate systems, but not so off line. Efficiency requires that whenever DMs have access to a source of information, they milk it dry regardless of its classification or the step they are on in the decision-making process. If they are at the step analogous to COMPARE, they will nevertheless collect information useful to the PLANNING step if it comes their way. The transfer of information--lifting it from books or people's minds and putting it into the form of notes for future study--should be done in a single step. The complete processing of that information in order to reach a decision occurs in separate steps, as in SIGI

Although it will be convenient in the following discussion to refer to a "COMPARE step" or a "PLANNING step" as if they were entirely separate, in practice the steps blend and their activities may occur more or less simultaneously.

Making a Chart of Information

Information will have to be classified as it is collected. One way to classify it is to make a chart like that illustrated in figure 38. Use a large sheet of paper and make as many columns as there are options for the decision.

The number of rows will depend on the number of different kinds of information that are relevant to the decision. There are three large classes that we have designated in accordance with the conceptualization in figure 32, Satisfactions, Requirements, and Manageability. Satisfactions includes the values dimensions, one row for each value that was weighted in the first step in the decision-making process. Satisfactions also includes any other item of information that describes or defines an option, one row for each item.

The rows given over to Requirements contain the items that pertain to the feasibility of an option in terms of the DM's status or ability. As an example, suppose that a DM had to be married to take advantage of some option. This information would occupy a row on the chart. The Requirements section also includes any information about how difficult an option may be to achieve. If a DM learned that only one applicant in five is admitted to a certain college under consideration, that information would be entered under Requirements.

The rows given over to Manageability contain information concerning the demands an option will make on the DM's resources. In buying a house, for example, DMs would collect information about monthly mortgage, tax, and insurance payments for each option. This information would occupy one row in the Manageability section of the chart. Also in the Manageability section would go information about investments in time, capital, or energy that must be made in order to achieve the option.

If many items of information are to enter into the decision, the chart may become cumbersome. Another way to make it is to use 3X5 cards in four colors. Information about values goes on cards of one color, one item per card, information about requirements on cards of another color, about manageability on a third card, and miscellaneous information on the fourth color. The cards can be kept portable in a file box, segregated by options. Then the final chart is assembled by Scotch taping the cards of each option to form a ladder that can be hung on a wall. The cards have to be arranged in the same order in each ladder so that the options can be compared quickly on any item of information.

Missing Information

Preparing an information chart for an important decision takes a lot of time. All necessary information seldom appears in a single source, with the result that the chart fills slowly even when much well-structured information is available. For instance, although DMs who are choosing a college can find a vast amount of information in The College Handbook, they will not find everything they want to know. Their chart will have empty cells that may be filled only be referring to the college catalog, visiting a campus, talking with officials and students, and perhaps tuning in on the kind of student publications that used to be considered underground. Some cells may never be filled because no information ever comes to hand.

Rating the Values Dimensions

Information about the opportunity to satisfy a weighted value should be rated at the time it is obtained. The rating looks ahead to the STRATEGY step. The rating is a numerical expression of how well the option is likely to satisfy the value. It is a kind of grade, like A, B, C.

It is impossible to give exact procedures for rating values information because different values figure in different decisions, and there is no way of covering them all. We can, however, describe the procedures we followed in rating the values dimensions of the SIGI occupational information, and these procedures can serve as a model.

We found that four ratings, 1-4, were enough to differentiate most information, but for High Income we allowed ourselves five because information about salaries could be easily divided into five categories. We chose a rating of 5 to designate a median income in excess of $20,000; 4 designates an income between $14,000 and $19,999; 3, between $10,000 and $13,999; 2, $7,000 to $9,999; and 1, below $7,000. For Early Entry we assigned a rating of 4 to occupations that required less than two years of education beyond high school for entry; 3 signified 2 to 3 years;

2 signified 4 years (bachelor's degree); and 1 signified 5 or more years (graduate training).

When categories could not be quantified, we carefully defined what each rating meant in operational terms. For example, for the value Helping Others we defined a rating of 4 as "Working with people directly to improve their health, welfare, or education"; a rating of 3 was defined as "Providing a service that makes life better for the general public in a significant way (for example, legal, aesthetic, or environmental); or having meaningful, but not vital influence on individual clients." The other ratings were similarly defined.

Some principles emerge: (1) The higher the rating, the better the opportunity to satisfy the value through the option (This high=better principle is necessary for STRATEGY to work); (2) the definitions of ratings are worked out with some care; (3) the definitions exclude judgmental terms like better, interesting, pleasing, beautiful, and so on; and (4) the definitions are rendered in quantities whenever possible, or as categories with definite boundaries, or in concrete and specific language that minimizes errors in interpretation.

Some persons may balk at putting so much effort into the ratings. Why can't they just react to each item of information, rating it 4 if it makes them ecstatic, 3 if they like it, and so on? Perhaps this method is all right for small decisions with short-lived consequences. But serious decisions with consequences that live into senility should be made with great care. The ratings need to be independent of the transient mood and bias of the rater, and an item of information that receives a rating of 2 after breakfast should not receive a rating of 3 before dinner. Errors in rating are multiplied in STRATEGY, and safeguards should be established to keep them under control.

When an item has been rated, the rating should be attached to the rest of the information in the proper cell on the chart.

Information about Jobs

Information about jobs is treated like information for any other decision. DMs must be careful to distinguish between information about occupations and information about the specific job options they are considering. The occupational information is likely to be true about the jobs, but there is no guarantee that it will be. Therefore, when gathering information, DMs should verify that the statements they got from SIGI or the *Occupational Outlook Handbook* apply to the particular jobs they are thinking about.

Information about jobs is often hard to come by. The details in ads or on file in placement offices and employment agencies are apt to be sketchy, especially with respect to the values dimensions. The best source of information is likely to be persons already employed and the employers themselves. For this reason DMs should go to their job interview primed to get answers to their most important questions. The DMs must have done as much homework as possible in advance of the interview. They should have identified and weighted their values and have filled in from other sources as many cells in their information chart as possible. The empty cells in each column indicate information still to be collected. The interview is a good place to get much of it.

Some persons are timid about asking questions in an interview. They may need counseling. If your college offers no special services or courses for job hunters, you should make sure that books on the subject are in your library or placement office.

INFORMATION PROCESSING--PREDICTION

An option may be impossible to attain, certain of attainment, or attainable with some undetermined probability. Usually one does not spend time or energy on the first two conditions, once they become known. For instance, if you are a male student, you would not apply for a scholarship open only to women. Or if you are studying a road map to decide on the best route to St. Louis, you take for granted that you will arrive regardless of the road you choose.

These two conditions are shown on the decisional flow chart in figure 33. Boxes 7 and 8 show the elimination of impossible options, and box 12 shows the path shunting the estimation of probabilities because the outcomes are certain.

Probabilities should, however, enter into the decision whenever the options can be differentiated by the degree of certainty of attaining them. For instance, in occupational choice it is obviously harder to become a physician than a salesworker; the two occupations differ in the probability that one can succeed in entering them.

Knowledge of this difference is an important piece of information to the DM. The processing of it takes place in box 13 of the flow chart in figure 33. In SIGI the comparable operation occurs partly in PREDICTION (the estimation of key course grades) and partly in STRATEGY (the estimation of chances of successful entry). In this discussion we will refer to it as the PREDICTION step in order to keep to the familiar nomenclature of SIGI.

The Relationship between the PREDICTION and PLANNING Steps

The question, "Given my abilities, is this option attainable?" assumes that I know what to do to attain it. The PLANNING step considers that aspect of the decision process. Therefore the PLANNING step cannot be separated from the PREDICTION step, and the two steps should really be taken simultaneously. As noted in the section of this chapter about the COMPARE step, information for all steps is collected in a single operation whenever possible. Therefore DMs should be able to go back and forth between PREDICTION and PLANNING as need be. In the remainder of this section we will assume that DMs have PLANNING information and consequently know what steps they would take in order to attain an option.

What Is Being Predicted

If only one step is required to attain an option, the prediction estimates the probability that the step will be completed successfully. For example, the young man applying for the scholarship may have completed all the scholastic requirements for eligibility. The only step remaining for him is to apply. His estimate will then be the probability that, given his background, previous performance, need, and so on, he will win the scholarship.

If more than one step is required, the DM may estimate either the probability of completing the most difficult step or all the steps. If one of the steps is outstandingly difficult, it may be more realistic to predict that. But if all the steps are about equally difficult, the best estimate may be the probability of completing the first times the probability of then completing the second, and so on.

For instance, the man applying for the scholarship may have to get an A in math (step 1) as well as win the award (step 2). If math is hard for him, he should estimate the probability of getting his A. If his chances of getting the A are fair, he should estimate the probability of winning the scholarship and modify that figure by the probability of getting the A.

As with everything else in decision-making, one cannot blindly follow a cook-book recipe. A judgment must be made as to what best represents the probability of attaining the option.

Estimating the Probabilities

Once the DMs have clearly in mind what it is they are estimating, they proceed to the estimation itself. The best estimate is derived from a regression equation based on actuarial studies, as in the SIGI Prediction system. But few decisions are the sort for which good studies exist, and few DMs know how to make the necessary calculations.

The only alternative is for the DMs to make the best estimate they can. We have some evidence that self-estimates based on good information are fairly valid. In our studies for the SIGI Prediction system, we have asked students to estimate how they stand (compared with other students) with respect to four factors selected by instructors as related to good grades in their courses. The students are also given a histogram showing the distribution of grades obtained by previous students. The students then predict their own grades, basing their estimate on all this information as well as information about their past scholastic performance.

In SIGI, use of these estimates as predictor variables yields multiple correlations with course marks just as high as or higher than those computed when test scores are included as predictors. This is not the same thing as saying the students' own estimates are as accurate as the predictions computed from the regression equations in which the estimates are weighted along with other predictor variables. But our studies do strongly suggest that when students are given sufficient information, their judgments are generally dependable. DMs can estimate the probabilities with some feeling of confidence.

The key to reliable self-estimates, then, is reliable information. In this age of computers hard information may not be so difficult to get as one might expect. In decisions concerning educational matters, for example, DMs can often get quite a number of solid facts based on institutional research. They may find out what the distribution of grades was in many courses, the percentage of students admitted with various SAT scores and their rank in their high school classes, the SES of entering students, the proportion of community college students with certain GPAs accepted by transfer institutions, the ratio of admissions to rejections, and much more. When such information is available, DMs should estimate their chances for each option separately in order to make sure that their estimate is based on the information and not on a comparison of the options. The estimate for one option should not influence the estimate for another.

Subjective probabilities--hunches, faith that right will prevail, confidence that one will luck it through—should be avoided as much as possible.

Predictions for Decisions about Jobs

Estimating the probability of getting a particular job is handled like any other prediction. If the DMs are qualified by training for the jobs and want to know only what their chances are of receiving an offer if they apply, they can ask their prospective employers what qualifications they hope to find in their employees, how many other applicants there are, and whether particular applicants (e.g., veterans) get preferential treatment. Applicants for Civil Service jobs have the right to know their test scores and their rank in the list of applicants. Such information can be translated into a probability figure that is more reliable than a mere guess. For instance, if a student is applying for a single opening for which she feels herself qualified, and nine other applicants are equally qualified, she may estimate the probability that she will receive the offer as 0.1.

If students making decisions about jobs must do something (take a course, get a degree) in order to become qualified, the probability then involves two steps. The students have to take into account the possibility that they will fail either step, and the estimate will be smaller than if only one step were involved.

INFORMATION PROCESSING—PLANNING

The purpose of the PLANNING step is to answer the question, "Is this option manageable in terms of my resources?" It may be compared to the PREDICTION step. PREDICTION concerns the degree to which an option is practicable in terms of the DMs' abilities, PLANNING the degree to which it is manageable in terms of their resources.

For example, I go into a restaurant for lunch and narrow down my options to a club steak at $5.95 and grilled hamburger at $1.25. Since I am healthy and hungry, no PREDICTION step is necessary; I assume a probability of 1 that I can eat either option. Interrogating my wallet, however, causes me to consider the PLANNING step: I find I have seven dollars. I can pay for either option, and my decision rests on how much of my resources I am willing to put out and how much more satisfactory the steak is than the hamburger plus whatever other uses I have for the money.

Like the PREDICTION step, the PLANNING step may not be necessary in order for DMs to reach a decision. If the DM's resources can be taken for granted for all options, there is no need to consider them in deciding. If my wallet were stuffed, I would not have to question whether my seven dollars would stretch to the end of the day; my choice of food could be determined by my taste values alone.

Dual Function of the PLANNING Step

Besides serving in the decision-making act, the PLANNING information also has a postdecision function. This is to provide a map showing the DMs how to attain an option once they have chosen it. Therefore DMs have to be cautious about ignoring the PLANNING step on the grounds that the information is irrelevant to the deciding process. They may find they need it after they have made the decision. For example, a student choosing a college may know that she has the money, time, and energy to go to any option she chooses. The PLANNING step need not enter into her decision except insofar as the information helps her in the PREDICTION step. Nevertheless, when she has made her decision, she will still have to know what preparatory courses and tests she should take, what the deadlines are for applications, where and how to apply, and so on.

Only when the DMs can take for granted that their resources do not figure in the decision and also that they know how to attain a chosen option, can the PLANNING step be skipped entirely.

Determining the Plans for an Option

Usually the things one must do to attain an option consist of a sequence of steps that must be taken in some fixed order. Many school curricula are of this sort; children must learn addition and subtraction before multiplication and division, and these before algebra, which they must master before going on to trigonometry and calculus.

The fact that the order of the steps is often more or less fixed allows DMs to use the technique of backward chaining in determining the steps to an option. Backward chaining requires that they determine the last step first and then work backwards step by step to the first.

As an example from SIGI, consider the steps I should take if I am a community college student desirous of becoming a pharmacist. I find I must pass a State licensing examination (last step). In order to qualify for the examination, I must, in most states, serve a year of internship under a licensed pharmacist (next-to-last step). To be accepted as an intern, I must obtain a bachelor of pharmacy degree. To work toward that degree, I must qualify myself for acceptance by a school of pharmacy. And in order to be qualified, I must take the proper courses at my community college, usually biology and chemistry (first step). The requirements for any step determine the activities of the step that precedes it.

The chain may be carried as far backward as need be to reach the step that the planner occupies. For example, if I do not have the prerequisites for enrolling in biology or chemistry, I must carry the chain back an additional step by planning to take the qualifying courses.

The final act in determining the plans is to reassemble the chain in the order in which the steps will be taken. The step that was determined last in the chain is the step that I would take first in my journey to becoming a practicing pharmacist.

Each step can be broken down into a series of substeps, with the result that the chain can consist of as many steps as are useful to the DM. It is hard to say how large each step should be. It is obviously silly to break the chain into so many tiny chainlets that it becomes a hodgepodge. Listing my daily chemistry assignments as separate steps is going too far. On the other hand, listing only the giant step "chemistry" is probably not sufficient for my needs if I must take general chemistry, organic chemistry, and biochemistry. The size of the steps depends on what is useful to the DM.

Relationship to the PREDICTION Step

The steps brought to light in the chaining operation are the ones that should be taken into account in the PREDICTION process. Knowing the steps they must take to attain an option allows DMs to judge which activities are most likely to strain their abilities.

Using the PLANNING step as an aid in estimating probabilities was discussed in the previous section of this chapter.

PLANNING in Decisions about Jobs

The techniques just described are applicable to decisions about jobs. The most difficult part of the procedure will be to gather the necessary information. Since the information about all the options is not usually assembled in one place, each option presents a separate problem. The best data are likely to come from the employers themselves, either in the form of published job descriptions or in response to direct questions from the DMs.

While on the COMPARE step of the decision-making process, DMs should draw up a list of questions that must be answered on the PLANNING step. The following list does not pretend to be complete:

1. What amount and kind of training does the employer hope to find in applicants for this job?
2. What amount and kind of experience does the employer look for?
3. Are there any tests that the applicant must take in order to become qualified for the job?
4. Does the applicant need a State or local license?
5. Does the applicant have to be a member of a union or professional group?

6. Does the applicant need a particular college degree or certificate for the job?
7. What application forms must be completed?
8. Is an interview required?
9. Is a resume required?
10. Are references required or useful?
11. Is registration with a placement office, employment agency, or employment service required or of advantage?*

There may be a backward chain associated with each of these questions, depending on the answer. For instance, if references are required or useful, the DM must obtain letters or permission from suitable persons. This task in turn entails identifying the persons.

Planning for jobs is obviously related to planning for the occupations that subsume these jobs. DMs should not, however, take for granted that completing the steps recommended by SIGI for entry into an occupation has automatically qualified them for a job they have their eye on. There will certainly be additional steps--applications, interviews, etc.--that are involved in decisions about jobs. Furthermore, SIGI concerns the occupation across the whole country. The preparation for a particular _job_ may be a little different from what appeared in SIGI. For instance, a local job may require certification or membership in a union.

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*Fees may be involved for private agencies and services. Generally, _agencies_ will do more work for the applicant than will a _service_; the employer often pays the agency fee, and no fee is required before the applicant has been hired. An employment _service_ usually requires a nonrefundable fee in advance with no guarantee of results. Check the practice in your area. Although many employment service organizations are undoubtedly honest, many are ripoffs.

There is no substitute for information.

INFORMATION PROCESSING--STRATEGY

STRATEGY summarizes the most important information from other systems in a form that reveals the rewards and risks of choosing each option. Since the information has already been collected, the only new thing the DM has to do is to make the simple calculations that lead to the desirability sums and pass judgment on the options.

Computing Desirability Sums

In SIGI the options (occupations) are treated three at a time because that is all the display screen will hold. Off line, all options should be treated at once.

DMs should make a chart modeled on figure 34. There will be as many columns as there are options plus an additional column for values and a narrow column next to it for the value weights. There will be as many rows as there are values that the DMs weighted.

Now DMs enter in the "Wt." column the weights that they assigned in the first step in the decision-making process. These are the weights as adjusted to sum to 4N. In the illustration there are twelve values and the weights add up to 48.

Now, for each option, DMs fill in the ratings that they assigned to that option when they were collecting information in the COMPARE step of the decision. The rating of course goes in the same row as the value that was rated. It is easy to make errors in this operation, and DMs should ask someone to check their work.

Next, for each option for each value, multiply the value weight ("Wt." column) by the rating and enter the product in the "Product" column. For example, for Value_1 the product for the first and second options is 7X3=21; for the third option it is 7X2=14; for the fourth 7X1=7; and for the fifth 7X4=28. Again, DMs must watch out for careless errors.

Finally, add all the products for each option and enter the sums. The option with the largest sum is the "best" in terms of the DM's values. To put it another way, it is the option that offers the most reward.

Evaluating the sums. Students on SIGI who see their sums displayed on the screen are warned that a difference of ten points or less between the sums is probably not significant. In chapter IX (pages IX-12 through IX-14) we explained how we arrived at ten as the number of points for a "significant difference." The errors of measurement represented by those ten points came about under nearly ideal conditions: The ratings were made by a team of experienced persons using carefully constructed definitions of what each rating meant, minimizing error in the rating factor of the product. Furthermore, the SIGI values had been carefully defined and were known to differentiate occupations. Therefore error in the weight factor was also minimized.

Neither of these procedural safeguards is present in the informal computation of desirability sums just described. Consequently, one would expect the inherent error to be much larger than ten points. It is impossible to say what the magnitude of the difference should be to reach significance. Clearly, the magnitude will depend somewhat on the number of values that go into the desirability sums--the more values, the larger the error.

The lesson is plain: the desirability sums must not be followed blindly. They are, nevertheless, informative guides. They synthesize much information into a single, useful figure as no other procedure could do. They possess considerable power, but like any powerful instrument, they must be used with control and discretion.

Short cut to desirability sums. If many values contribute to desirability sums, DMs may want to shorten the computation and at the same time take insurance that their top values have a good chance of being satisfied.

It is theoretically possible that the option with the highest sum would not be the most satisfactory with regard to the DM's most important values. This result would occur if a great many low-weighted values happened to match high ratings in the option, while the few high-weighted values matched low ratings. The combination of high weight, low rating would be swamped in the sums by the multitude of low weight, high rating products, with the result that DMs might choose an option that would satisfy their least important values while failing to satisfy their most important ones.

This situation can be avoided by the procedure illustrated in figure 35. The DM identifies the values weighted 4 or higher and uses them to compute the sums. Values weighted less than 4 are disregarded.

As it happens, there is little differences in the outcomes of the procedures illustrated in figures 34 and 35. Options 5, 1, and 3 rank first, second, and third no matter how the sums are computed. But DMs must be alert for vagaries in the sums.

Two words of caution are in order about the short-cut computation. First, if the DM's values profile is flat with all of the values weighted near 4, there is probably not enough difference in importance to make the short cut practicable. Information may be lost rather than gained. Second, in restricting value weights to sum to 4N, DMs were told that the absolute weight assigned to a value was not so important as the relative weight. Therefore a weight of, say, 3 does not mean the value is unimportant; it may still be important, only less so than some other value weighted higher. Before dropping from the desirability sums all values weighted less than 4, DMs should make sure that they are not giving up something they want represented in the final sum. DMs should use the short cut only when they feel it is essential for their most important values to dominate the sums.

Computing the Risks

Chances of attaining the option. When DMs were on the PREDICTION step, they estimated the probability (chances in 100) that they could attain each option. All that remains for the STRATEGY step is to transfer those figures to a chart like that shown in figure 40 for a decision about automobiles.

As noted earlier in the discussion of the PREDICTION step, the estimation of probability will be bypassed if the DM's ability to attain the option is not in question. In that case there is no need for a chart like that in figure 40 because there is nothing to go in the "Chances in 100" column. The decision may then be made solely on the basis of desirability sums, with the warning that the sums are only a guide that must be treated circumspectly.

Notice that a student using SIGI makes his estimate of his chances when he is in STRATEGY. By contrast, in this decision-making model, the estimation takes place in PREDICTION, and the figures computed there are merely transferred to the STRATEGY step. The difference in procedure comes about because the SIGI Prediction system concerns only one small step--passing a key course--among all the steps leading to entry into an occupation. The key course estimate is kept separate from the successful entry estimate because the former can be treated statistically, with a great increase in accuracy. In our nonSIGI model, however, we assume that statistical methods will not be available to DMs. We therefore telescope into a single operation the two separate estimates that occur in SIGI.

Other forms of risk. In SIGI and thus far in the discussion of the generalized model of decision-making, we have defined risk as "failure to attain an option." In some kinds of decisions risk might better be defined as "loss if things go wrong." For example, if a person were inclined to play Russian roulette, inserting one bullet in the cylinder of a revolver, spinning the cylinder, holding the muzzle to his temple, and pulling the trigger, the chances are 5 in 6 (about 83 in 100) that the hammer will fall on an empty chamber and the desired result will occur.

But surely this is a strange way to think about "the odds." In Russian roulette it would be better to think about the loss as a consequence of failure than to think about the chances of failing. Since the loss is loss of life, the "chances" column in figure 40 becomes a tremendously important factor in the decision.

Decisions about gambling choices should take account of losses, not just probabilities. For example, a person with a four-card flush in a poker game can compute the probability of filling the flush on the draw. But before he draws, he should estimate his gain (the size of the pot) if he fills the flush and wins, and his loss (what it has cost him to draw). If the odds are only 1 in 5 that he will fill the flush and win, but his potential gain comes to only three times his potential loss, it is a bad bet; in the long run, he would never win enough pots to make up for his accumulated losses.

The topic of estimating the consequences of not succeeding are beyond the limits of a counselor's handbook. It is brought up here as as example of the fact that no recipe can cover all situations. Ordinarily, knowledge of chances of attaining or not attaining an option is adequate for making judgments about risks. But sometimes it is necessary to look beyond mere chances to the consequences of failure.

Assessing Desirability Sums and Chances

In general, the results of the STRATEGY computations are evaluated as they are on SIGI, with allowance for the fact that neither the sums nor the estimation of chances is as precise as the corresponding figures on SIGI. Four conditions may exist:

1. Variability in sums, chances about equal. If the probability figures are roughly the same, the decision can be made on the basis of the desirability sums alone. The judgment as to whether the chances are "about equal" will depend on the quality of the information that went into them. If the estimates are based on solid, actuarial information and really mean something, differences of 15 to 20 points should not be ignored. If, however, they rest on opinion and guesses, they should be viewed with caution. If the chances for one or more options are near 0 or 100, they should probably not be ignored; DMs who estimate probabilities near the extremes obviously have feelings about those options that should be respected in the final decision.

2. Sums about equal, variability in probability. If the sums are roughly equal but the probabilities are distinctly different, the decision may be made on the basis of the probabilities alone. Before rejecting any options, DMs should take special care to check out the values dimensions of the candidate options. As explained earlier, two desirability sums might appear equal when one of them rated low on the more important values and high on numerous less important ones, whereas the other was the reverse.

3. Sums and probabilities both about equal. If the desirability sums are roughly equal and so are the probabilities, the decision may reasonably go to any of the options. It may be useful in this case to assess the most important values, and eliminate the options that are weakest on them.

4. Variability in both sums and chances. If both the desirability sums and probabilities show so much variability that they are clearly unequal, the rules recommended by SIGI can be used: (1) If one option has both the highest sum and the highest probability, it is clearly the best. (2) If an option has such a low desirability sum as to be unappealing or such a poor probability as to be unacceptable, reject it. (3) In other combinations, try to find the option with an acceptable sum at an acceptable risk. A DM may go for the highest sum (most reward), if the risk is acceptable; the highest probability (least risk), if the reward is acceptable; or some diminished reward with concomitant reduction in risk (neither highest desirability sum nor best probability).

Reaching a Decision

No decision should be made on the basis of STRATEGY alone. The STRATEGY step is an efficient way to summarize and evaluate information about the satisfactions/values and the requirements/abilities dimensions of the options. But it does not take into account all information; it ignores the manageability/resources dimension and the other information that does not concern values. Therefore STRATEGY merely adds one more item of information to the total that goes into the decision.

Contingency plans. In any decision in which probabilities figure, DMs must understand that the act of deciding on an option does not guarantee getting it. Even when the odds look good, DMs should have second- and third-choice options that they can fall back to if their first choice fails to materialize. Then the plans for obtaining the first-choice option should be modified in order to make them applicable to the second and third choices as well as the first choice.

For example, a high school student expects to go to a four-year college and is deciding where to apply. Let us say that a state university and a private university are about equally desirable with acceptable chances; various campuses of State colleges are next in desirability, though higher in chances; and the local community college has a lower desirability sum for this student because he gave heavy weight to the value living at a distance from home. Other options have been eliminated during the decision-making process.

The most rational behavior for this student is to apply to all institutions--and this is standard practice for many college-bound students. When acceptances or rejections come in, the DM can make a final decision.

The idea of providing for contingencies has implications for the student's plans. The student should now plan to take a high school program that will, as much as possible, qualify him for admission to all the institutions.

Contingency planning is useful in many decisional situations. Community college students who expect to transfer can take a pattern of courses that will qualify them for several four-year colleges. Students choosing a career can take courses that will prepare them for various related occupations. Thus a would-be physician may fall back to physician's assistant, secondary school teacher, nurse, medical laboratory technician, physical therapist, or other occupations if the route to the medical degree becomes rocky. Many decisions about jobs offer scope for contingency planning.

Notice that the information gathered for the manageability dimension of the options is the most useful in making plans. This information shows the steps the DM must take to obtain an option. The steps for a favored option can be compared with those for a contingency option, and a plan can be made for keeping both options alive as long as possible.

STRATEGY in Decisions about Jobs

No additional changes in the STRATEGY procedures should be required just because the decision concerns jobs. One word of caution, however, may be helpful. Since information about jobs usually comes from many different sources, it is likely to be uneven in quality. In computing desirability sums, DMs should put a question mark beside any rating or estimate that is shaky as a warning against giving it undue weight in the decision.

AN EXAMPLE

As an example of the model in action we will take the purchase of a new car.

The Decision-Maker

The DM is an elementary school teacher, Ms. Paragon.

Her values. Ms. Paragon would really like a nifty little sports car that flashes and purrs. But the practicalities of her life dictate a model that will seat at least four, be inexpensive, and be economical to drive. Appearance and comfort are also important to her. Her friends have also convinced her that the car should "handle" well, have decent acceleration, and come equipped with steel-belted radial tires. She expects other values to surface as she begins to look around.

Her abilities. There is only one constraint in the abilities dimension. Ms. Paragon has made a commitment to use the new car for her vacation, which begins in five weeks. The commitment involves other persons, and the plans cannot be changed. Therefore she must get delivery within a month. She cannot meet a requirement that she wait six weeks.

Her resources. Ms. Paragon earns about $10,000 per year. She can finance the car through her credit union, which will lend her three-quarters of the list price of the car (including taxes but not including freight and dealer preparation charges). This would be a 36-month, 8% loan. Ms. Paragon estimates that she can stand payments of about $75.00 per month, in addition to about $25.00 per month for insurance.

Her resources include a 1967 Volkswagen for which she has informally been offered $700 in a private sale. She is 90% certain that she can get that amount and 100% certain that she can get at least $600. She can take another $200 from her savings, but if she goes beyond that figure she will have to skimp on her vacation. She would naturally like to cut into her resources as little as possible.

Step 1: Identifying and Weighting Values

("Step 1" refers to box #1 in the flow chart, figure 33.)

Ms. Paragon listed and defined to her satisfaction the values shown in figure 36. Most of the values she was able to define in terms of articles she had read in Consumer Reports or Road and Track. For example, performance she defined in terms of acceleration from 0 to 60 miles per hour. Comfort gave her some trouble. After some thought, she broke the value down to seating comfort (leg room, head room, back support, accessibility of controls) and riding comfort (response to bumpy roads, sway, cornering). For appearance she decided to rely entirely on her own personal tastes. She knew she liked the metallic paints, especially blue, and she knew when a car looks great and when it doesn't.

She weighted these values on the SIGI eight-point scale. Her first sum was 71; she had to adjust the weights to sum to 12 x 4, or 48. She noticed that price, model, mileage (fuel economy), and repair record were all weighted 8. Were they all equally important? She had friends who would help her with repairs, and she was willing to give a little on mileage as long as she did not end up with a monster. Following such reasoning, she finally succeeded in readjusting her weights to sum to 48.

The adjustment is shown in the "Adjusted" column of figure 36. The third column shows a subsequent readjustment, which will be explained later.

Steps 2 and 3: Identifying and Narrowing down the Options

There are well over one hundred different makes and models of automobiles listed in such source publications as Consumer Reports, Road and Track, and Changing Times. Therefore Ms. Paragon decided to pare this number down to a reasonable size.

She used her two top-weighted values, price and model, as her search values. She specified that a car must carry a list price below $3000 in order to qualify for consideration. Also, after some reading, she further specified that the model must be a two-door sedan. (Four-door models were too expensive and hatchbacks all seemed to lack comfort in the rear seat. Sports cars, alas, were too small.)

Using these two values/specifications as a screen, she narrowed the list down to fifteen contenders. This was still too many. Therefore she invoked her third most important value, fuel economy. She specified that a car must have achieved a minimum of 18 miles per gallon (average of city and open road conditions) in Environmental Protection Agency tests. This addition to her screen narrowed the list down to seven contenders: the Atomic, Bravo, Cutthroat, Dagger, Elf, Flame, and Gypsy.

Steps 4-10: Collecting Information

The operations flow charted in boxes 4-10, figure 33, occur more or less simultaneously. That is, Ms. Paragon assessed the information as she got it in order to eliminate clearly unworthy options (boxes 5 and 6), impossible options (boxes 7 and 8), and unmanageable options (boxes 9 and 10).

Information about satisfactions. Ms. Paragon constructed a preliminary information chart (figure 37). She filled in the information she had already collected from her reading. The blank cells in the chart indicate data still to be collected from dealers and other sources.

She then went to the dealers themselves and learned the selling price of each car, found out that she would have to pay extra for the steel-belted radial tires, and inquired about brakes. She also studied the dealers' color charts and looked at floor samples to make judgments about the value appearance. Along the way she picked up bits of miscellaneous information about standard and optional equipment and the availability of various options.

Steps to attain the option. In making her preliminary information chart, Ms. Paragon determined the steps she would have to take to attain the options:

1. Sell her VW.
2. Obtain financing.
3. Obtain insurance.
4. Make up remainder of down payment from her savings.
5. Get delivery within one month.
6. Make monthly payments.

She called the credit union and was told the terms of financing each option. Her insurance company gave her the insurance costs for each car. She had already determined that she could sell her VW, and she knew that she did not want to take more than $200 from her savings, although she could do so in a pinch.

To her surprise, she discovered that not all dealers could guarantee delivery within a month in the color that she preferred. She questioned the dealers closely. How long had it taken to get delivery on previous orders? Did some other nearby dealer have the exact car she wanted? Could they get information from the factory? She realized that the dealers' answers were not the most reliable information in the world, but since she had nothing better to go on, she had to use it as best she could.

Eliminating unsatisfactory options. When the dealer for the Gypsy told her that he could not promise delivery within any specified time owing to a strike of longshoremen (the Gypsy is an import), Ms. Paragon eliminated it from her list. She was not sorry to see it go, for the price had apparently gone up so it now failed on her most important value. Furthermore, it was low on other important values, mileage and repair record.

She did not consider any other options clearly unworthy, impossible to attain, or unmanageable in terms of her resources.

Completing the information chart. Ms. Paragon now filled in the empty cells in the information chart (figure 37) with the data she had got from dealers, the credit union, and her insurance company.

Readjusting the Value Weights

Before rating the options on their capacity to satisfy her values, Ms. Paragon noticed that all the surviving options were two-door sedans and that none of them offered steel-belted radial tires as standard equipment. She therefore eliminated those values from her list because they no longer discriminated between options.

She also noticed that in reducing the number of her options, she had obtained a set that had only a narrow range of prices. Therefore the value price did not discriminate very effectively between her choices. Consequently, she reduced its weight from 8 to 3 and distributed the extra five points among the remaining values in order to maximize their contribution.

She was satisfied that price and model had already played a large part in the decision, for all options satisfied them. The values had not changed in their importance; they were reduced or eliminated only because they no longer discriminated between these options. If other options were to be added for consideration, Ms. Paragon would revive the values with their original weights.

Step 11: Rating the Options on the Value Dimensions

Now Ms. Paragon rated each of the remaining options on each of the values. In order to standardize this procedure, she defined each rating category in accordance with table IV.

The scale for the ratings was determined by the information available. For handling, the information mentioned only two categories, fair to good and good; therefore Ms. Paragon rated the options either 1 or 2 on that value. But for predicted repair, her source (Consumer Reports) named four categories, and Ms. Paragon therefore used a four-point scale.

Ms. Paragon next entered the ratings on her information chart (figure 38).

TABLE IV

SCALE OF VALUE RATINGS FOR A CHOICE OF AUTOMOBILES

		Rating			
Value	Basis	4	3	2	1
Price	Selling price	$2900-3019	$3020-3139	$3040-3259	$3260-3380
Performance	Acceleration 0-60 per CR		16.5-18.4	18.5-20.4	above 20.4
Fuel economy	Mpg per EPA avg. city & open road	Above 26.5	23.6-26.5	20.8-23.5	18.0-20.7
Braking	Opinion of CR	Very good	Good	Fair to good	Fair
Seating comfort	*	3.67	3.33	2.67	2.33
Riding comfort	**		3	1.5	1
Noise	Opinion of CR		Fairly high	High	Very high
Repair record	Opinion of CR	Much better than avg.	Better than avg.	Average	Worse than average
Handling	Opinion of CR			Good	Fair
Appearance	Opinion of buyer	First rate	Second rate	Third rate	Fourth rate

*Based on opinion of Consumer Report. Fair=4, fair-to-poor=3, poor=2, very poor = 1. Final rating is twice the rating for front seat comfort plus the rating for rear seat comfort divided by three.

**Based on opinion of Consumer Report. Fair-to-good=4, fair=3, fair-to-poor=2, poor=1. Final rating is the average of the ratings for light load and heavy load.

Steps 12 and 13: Estimating Probabilities

Ms. Paragon next estimated the probability that the cars would be delivered within the month available to her. The estimates were based on the dealers' statements, unreliable as they might be, and Ms. Paragon's own judgment about their truthfulness. She did not like the strong subjective element in the estimates, but she was aware that nothing calamitous would happen if they were wrong. She felt confident that she could get a second- or third-choice option quickly if her first choice did not materialize.

She entered her estimates on her information chart.

Step 14: Computing the Desirability Sums

All the hard work had now been done. Ms. Paragon transferred her value weights and ratings to a desirability chart. She then multiplied the weights by the ratings and added the products for each option.

The completed chart is shown in figure 39.

Ms. Paragon noted that the Elf achieved its large desirability sum primarily because it was so strong on the top-weighted values. The lesser values were pretty much a washout for that car. By contrast, the Dagger achieved its sum largely because it was strong on the lesser values and weak on the most important ones.

Ms. Paragon recalculated the sums, using only values weighted 4 or higher. The Elf was still the winner, but the Dagger had fallen from second place to fourth.

Steps 15-21: Assessing the Results

Ms. Paragon now made a chart (figure 40) showing the sums and probabilities for each option. Neither the sums nor the probabilities were equal (boxes 15 and 17 of the flow chart, figure 33), and no option had both the highest sum and best probability (box 19). Therefore she debated the issues as presented in box 21.

She decided to eliminate the Atomic because of its low sum, and the Cutthroat and Dagger because of their low ratings on mileage and repair record and because the probabilities were less than certain.

The remaining cars were the Bravo, Elf, and Flame. The Elf had the highest sum, but with little return on comfort, performance, noise, or handling. Was she willing to sacrifice these values in order to obtain the maximum on her more important ones?

She could not resolve this question without more information. She returned to the dealer and drove a demonstration model under several conditions. She concluded that the car was relatively poor with respect to these values, but that in an absolute sense it was acceptable.

Also, the Elf was well within the margin of her resources and would in fact give her some extra money for accessories. Was the risk acceptable? Ms. Paragon decided that it was, largely because in an emergency she could get an Elf with a less desirable paint job, or she could get a Flame or a Bravo. She would not be risking a large loss if her first choice turned out to be unattainable. Her only risk would be that she would have to accept a less desirable option.

Next she considered the Bravo. It was poor on price and braking and low on appearance. Furthermore, it would eat into her resources more than the others would do. Yet it had the advantage of being immediately available.

Finally, the Flame. It was only slightly inferior to the Elf in price, mileage, and appearance, and showed some improvement in comfort, noise level, and handling. Braking rated low, but the information chart did not say that it was actually dangerous. It was well within her resources.

Ms. Paragon debated all the options and finally decided on the Elf, largely because it so clearly outranked the others on the values weighted 4 or higher and because the consequences of not attaining it did not represent a serious loss.

Step 22: Review of All Dimensions

Ms. Paragon next reviewed all her information about the Elf. She thought she had already answered her misgivings about the low-rated values. She did not think she had overlooked any essential information in reaching her decision.

She remembered that she had originally placed a high weight on steel-belted radial tires. Could she get them after all? She struck a bargain with the dealer: She would buy the car if he agreed to cancel her order if delivery were not made in four weeks and if he agreed to include the radial tires for an additional $100. He accepted these conditions, and she gave him her deposit.

Step 23: Contingency Plans

Ms. Paragon's contingency plans are to take the Flame if the Elf is not delivered in time. If a Flame is not available at that time, she is also willing to accept an Elf in a less desirable color. As a last resort, she would be willing to take a Bravo.

She has collected so much information on these options that she feels prepared to choose among those available if she has to.

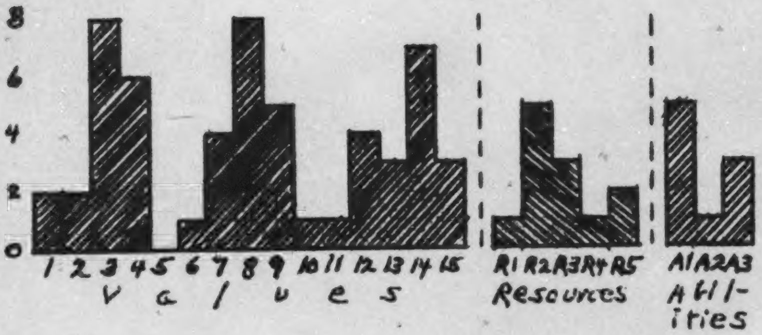

FIGURE 31

Profile of a decision-maker. The decision-maker is conceptualized as possessing numerous values, abilities, and resources. The importance of a value is indicated by the height of a bar on an arbitrary scale ranging from 0 (no importance) to 8 (maximum importance). Similarly, the degree to which an ability or resource is present is indicated by the height of the bar. The number and character of the values, resources, and abilities that are relevant in any decision would depend on the nature of the situation. No two decision-makers would have exactly the same profile.

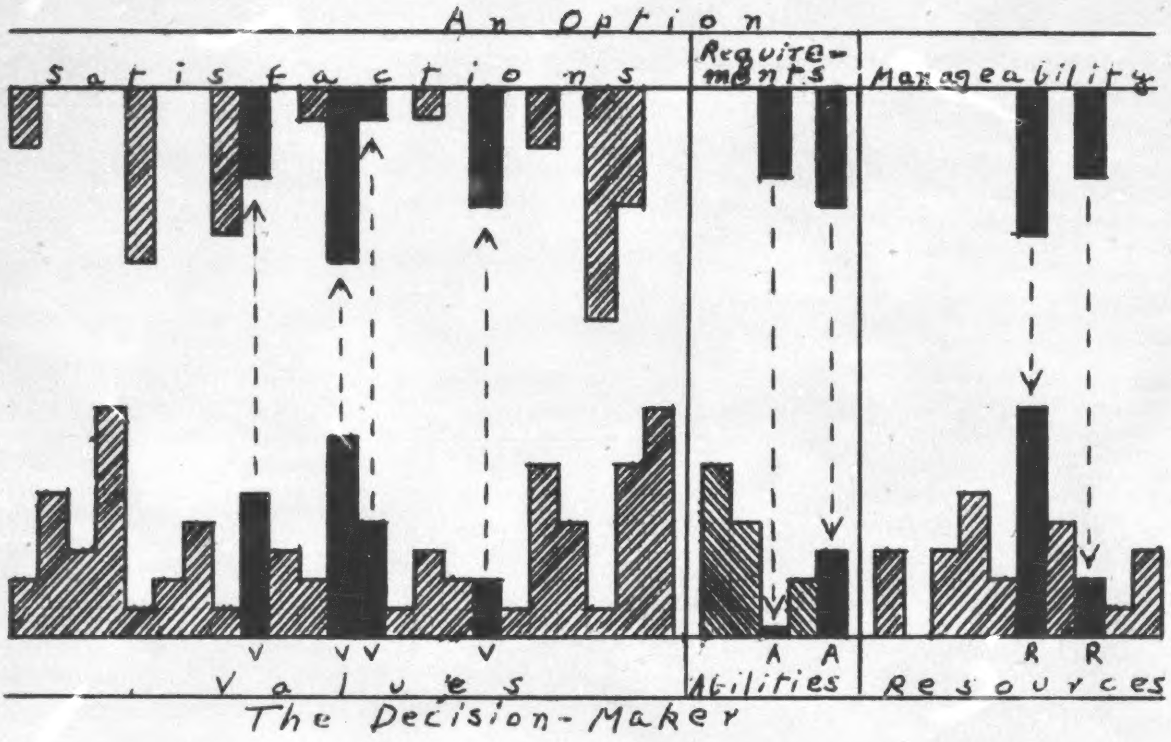
An Option
Satisfactions
Requirements
Manageability
V V V V
A A
R R
Values
Abilities
Resources
The Decision-Maker

FIGURE 32

The relationship between the decision-maker and an option that is a candidate in the decision. Of all the values held by the decision-maker (hatched bars), only a few (solid bars) are relevant to the decision. Correspondingly, an option may have the potential to satisfy numerous values (hatched bars under "satisfactions"), but only those that concern the relevant values (solid bars) play a large part in the decision. Similarly, the decision-maker has numerous abilities and resources, but only those required to implement the decision (solid bars) are taken into account in the decision-making process. The broken arrows show that during the process judgments about the desirability of the option proceed from the values held by the decision-maker to an assessment of the option's capacity to satisfy them. Judgments about the practicability of implementing the decision proceed from the requirements and manageability of the option to an assessment of the abilities and resources of the decision-maker.

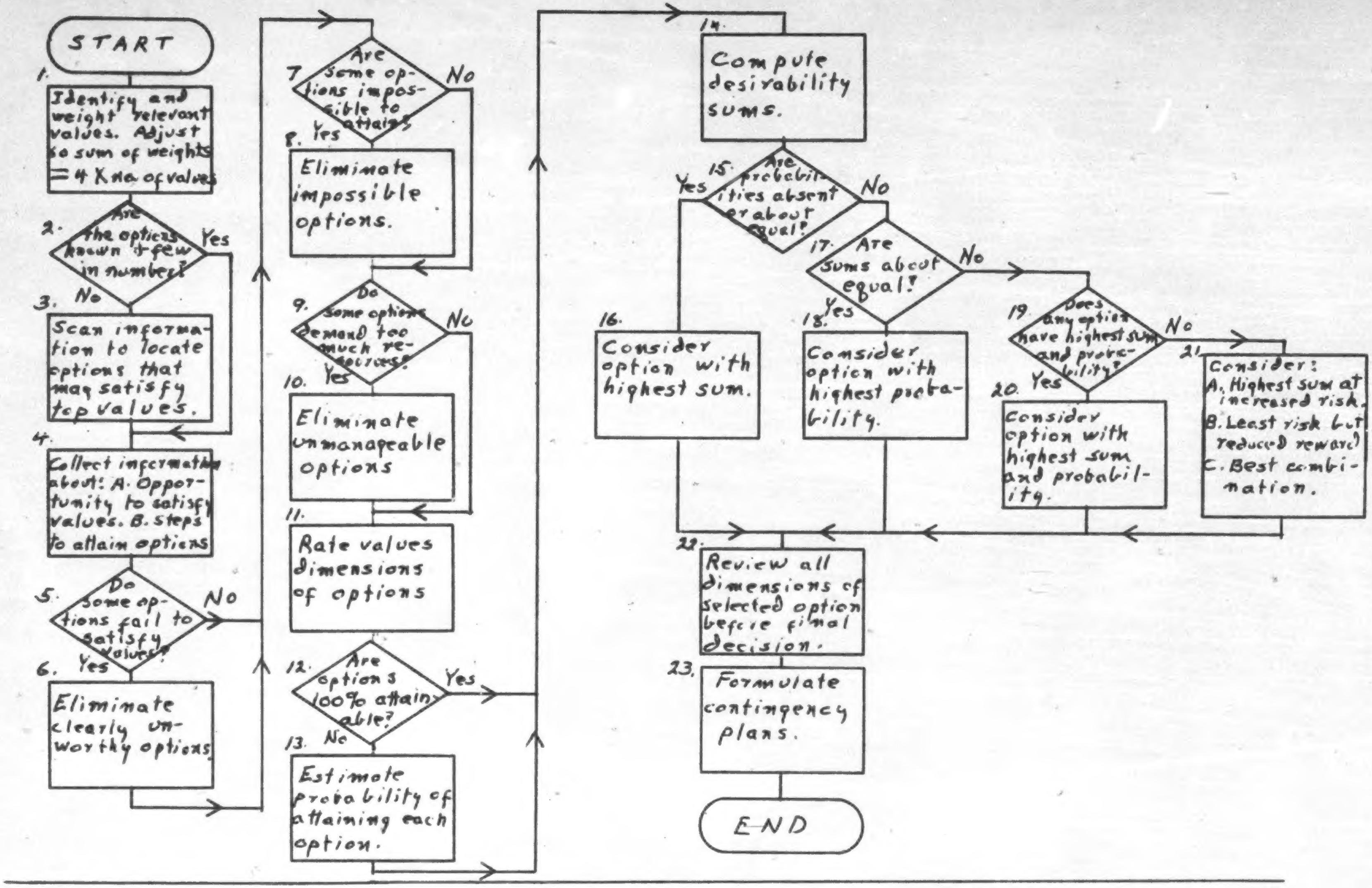
START
1. Identify and weight relevant values. Adjust so sum of weights = 4 X no. of values
2. Are the options known & few in number?
Yes
No
3. Scan information to locate options that may satisfy top values.
4. Collect information about: A. Opportunity to satisfy values. B. Steps to attain options
5. Do some options fail to satisfy values?
No
Yes
6. Eliminate clearly unworthy options
7. Are some options impossible to attain?
No
Yes
8. Eliminate impossible options.
9. Do some options demand too much resources?
No
Yes
10. Eliminate unmanageable options
11. Rate values dimensions of options
12. Are options 100% attainable?
Yes
No
13. Estimate probability of attaining each option.
14. Compute desirability sums.
15. Are probabilities absent or about equal?
Yes
No
16. Consider option with highest sum.
17. Are sums about equal?
No
Yes
18. Consider option with highest probability.
19. Does any option have highest sum and probability?
No
Yes
20. Consider option with highest sum and probability.
21. Consider: A. Highest sum at increased risk. B. Least risk but reduced reward C. Best combination.
22. Review all dimensions of selected option before final decision.
23. Formulate contingency plans.
END

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FIGURE 33

Flow chart of the decision-making process. The diamond-shaped boxes represent points where the decision-maker chooses between alternative courses of action. The rectangles represent points where information is collected or processed. Although the chart shows the steps as sequential, many of them actually may occur simultaneously.

		Option 1		Option 2		Option 3		Option 4		Option 5	
Value	Wt.	Rate	Prod.	Rate	Prod.	Rate	Prod.	Rate	Prod.	Rate	Prod.
Value_{1}	7	3	21	3	21	2	14	1	7	4	28
Value_{2}	8	1	8	2	16	2	16	1	8	2	16
Value_{3}	7	2	14	1	7	3	21	1	7	3	21
Value_{4}	4	3	12	2	8	3	12	4	16	4	16
Value_{5}	3	3	9	2	6	3	9	3	9	4	12
Value_{6}	3	3	9	1	3	2	6	1	3	1	3
Value_{7}	5	4	20	2	10	1	5	3	15	1	5
Value_{8}	4	2	8	4	16	3	12	4	16	4	16
Value_{9}	2	4	8	1	2	3	6	2	4	1	2
Value_{10}	2	4	8	3	6	4	8	3	6	2	4
Value_{11}	1	2	2	1	1	3	3	4	4	4	4
Value_{12}	2	2	4	1	2	2	4	4	8	3	6
	Sum		123		98		116		103		133

FIGURE 34

Chart for computing desirability sums. For each option, the figures in the columns labeled "Prod." are obtained by multiplying the weight ("Wt.") assigned to a value by the rating ("Rate") of the option on the same value. The products are then added to obtain the sums.

Value	Wt.	Option 1		Option 2		Option 3		Option 4		Option 5	
		Rate	Prod.	Rate	Prod.	Rate	Prod.	Rate	Prod.	Rate	Prod.
Value_1	7	3	21	3	21	2	14	1	7	4	28
Value_2	8	1	8	2	16	2	16	1	8	2	16
Value_3	7	2	14	1	7	3	21	1	7	3	21
Value_4	4	3	12	2	8	3	12	4	16	4	16
Value_7	5	4	20	2	10	1	5	3	15	1	5
Value_8	4	2	8	4	16	3	12	4	16	4	16
	Sum		83		78		80		69		102

FIGURE 35

Desirability sums based only on the most important values. These are the same options used in figure 34, but values weighted below 4 have been excluded.

Value	Preliminary	Adjusted	Readjusted
Price	8	7	3
Model	8	7	-
Performance	4	2	2
Fuel Economy	8	6	8
Braking	7	5	5
Seating Comfort	4	2	3
Riding Comfort	4	2	3
Noise	5	3	3
Repair Record	8	5	7
Radial Tires	6	4	-
Handling	3	1	2
Appearance	6	4	5
Sum	71	48	40

FIGURE 36

One person's values and their weights for a decision about a new car. The "Preliminary" column shows the absolute weight assigned to the values on the eight-point SIGI scale. "Adjusted" shows the relative weights as revised to sum to 48, or 4 times the number of values. In the "Readjusted" column two values were dropped because they failed to differentiate the options, and price was reduced because all the final options were in a satisfactory price range.

SATISFACTIONS

	Atomic	Bravo	Cutthroat	Dagger	Elf	Flame	Gypsy
Price (list)	$2799	$2999	$2769	$2979	$2728	$2806	$2998 (?)
Price (del.)							
Accel. (0-60)	17 secs.	19 secs.	16.5 secs.	16.5 secs.	22 secs.	21 secs.	22.5 secs.
Mileage (mpg)	19.6	24.9	21.0	18.0	29.1	24.8	18.0
Braking	Fair to good. Some fade	Fair. Some fade.	Good. Fade resist. fair.	Very good if optional disc in front.	Good. Fade resist. good.	Fair. Long stopping distance.	Fair. Some fading.
Seating comfort	Front: fair Rear: poor	Fr.: Poor ro fair. Rear: very poor	Front: fair Rear: poor	Front: fair Rear: fair to poor	Fr.: poor to fair. Rear: very poor	Front: fair Rear: poor	Front: fair Rear: fair
Riding comfort	Light: poor to fair Load: poor	Light: poor Load: poor	Light: poor to fair Load: poor	Light: fair to good Load: poor to fair	Light: poor Load: poor	Light: poor to fair Load: poor	Light: fair Load: poor to fair
Noise	High. Road noise, exhaust bangs	High. Rear axle howls	High. Transmission howls	Fairly high. road noise	Very high. Road & engine noise	High. Road noise	High. Transmission noise
Predicted repair	Worse than average	Much better than average	Average Clutch below average	Average Transmission below average	Much better than average	Much better than average	Worse than average
Radial tires							
Handling	Fair to good Nonpower	Good. Nonpower	Fair to good. Nonpower	Good. Power recommended	Fair to good. Nonpower	Good. Nonpower	Fair to good. Power only

FIGURE 37

Preliminary information for the decision about automobiles. So far, all the information has come from published materials. The blank cells represent information still to be collected from dealers and other sources.

	Atomic	Bravo	Cutthroat	Dagger	Elf	Flame	Gypsy
Appearance							
Brakes		Power discs standard	Front disc			Power disc in front	
Miscellaneous							
Requirements							
Manageability	If cost (less freight and dealer prep) is $3,000, credit union will finance $2250 @ $70.52 per month. Insurance prob about $318 per year. Sale of old car, $700. $200 from savings OK.						

FIGURE 37 (continued)

SATISFACTIONS

	Atomic	Bravo	Cutthroat	Dagger	Elf	Flame	Gypsy
Price (list) **Price (del.)**	$2799 $3068 ③	$2999 $3327 ①	$2769 $3033 ③	$2979 $3251 ②	$2728 $2936 ④	$2806 $3027 ③	$2998 (?) $3429 (!)
Accel. (0-60)	17 secs. ③	19 secs. ②	16.5 secs. ③	16. 5 secs ③	22 secs. ①	21 secs. ①	22.5 secs.
Mileage (mpg)	19.6 ①	24.9 ③	21.0 ②	18.0 ①	29.1 ④	24.8 ③	18.0
Braking	Fair to good. Some fade. ②	Fair. Some fade. ①	Good. Fade ③ resist. fair.	Very good if optional disc in front. ④	Good. Fade resist. good. ③	Fair. Long stopping ① distance.	Fair. Some fading.
Seating comfort	Front: fair Rear: poor ③	Fr.: poor to fair. Rear: very poor ①	Front: fair Rear: poor ③	Front: fair Rear: fair to poor ④	Fr.: poor to fair. Rear: very poor ①	Front: fair Rear: poor ②	Front: fair Rear: fair
Riding comfort	Light: poor to fair Load: poor ②	Light: poor Load: poor ①	Light: poor to fair ② Load: poor	Light: fair to good ③ Load: poor to fair	Light: poor Load: poor ①	Light: poor to fair ② Load: poor	Light: fair Load: poor to fair
Noise	High. Road noise, ex- ② haust bangs	High. Rear axle howls ②	High. Transmission howls ②	Fairly high. road noise ③	Very high. Road & engine noise ①	High. Road noise ②	High. Transmission noise
Predicted repair	Worse than average ①	Much better than average ④	Average Clutch below average ②	Average ② Transmission below average	Much better than average ④	Much better than average ④	Worse than average
Radial tires	No	No	No	No	No	No	No
Handling	Fair to good. Nonpower ①	Good. Nonpower ②	Fair to good. Nonpower ①	Good. Power recommended ②	Fair to good. Nonpower ①	Good. Nonpower ②	Fair to good. Power only

FIGURE 38

The information chart completed. Notice that no further effort was expended on the Gypsy after it was eliminated because of its unsuitable practicability. The handwritten figures are the ratings assigned after the chart was assembled.

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		Atomic	Bravo	Cutthroat	Dagger	Elf	Flame	Gypsy
Satisfactions	**Appearance**	No SA. Ordinary colors ①	Ersatz of bigger cars. Good colors ②	Blah. Dull colors. No ① metallic paint	Cute. Metallic blue OK ④	Zippy. Metallic blue is pretty ④	Too much chrome. ③ Colors OK	Looks like a bulldog. Dim colors
	Brakes	Drum. Power optional, $40	Power discs standard	Front disc	Front disc optional, $29	Power disc in front, drum in rear	Power disc in front	
	Cost of radial tires	$118.50	$160.00	$120.00	$140.00	$150.00	$160.00	
	Other Miscellaneous		Defogger		Adequate leg room. Defogger. Power steering, $55			Auto transmission only. Phooey.
Requirements	**Requirements**	Most recent delivery took 3wks. Says my car the same. (?) (75)	In stock (160)	Slow. Good chance another local dealer can supply (75)	"Pretty sure" can get in 3 wks. Joe had to wait 5. (70)	2-5 weeks. 2 of last 5 orders took more than 4 wks. (60)	In stock (100)	Longshoreman strike, can't promise anything
Manageability	**Amount financeable**	$2204	$2362	$2180	$2338	$2148	$2210	
	Insurance	$318	$318	$318	$339	$318	$318	
	Monthly payments	Fin. $69.00 Ins. 26.50 Tot. 95.50	Fin. $74.00 Ins. 26.50 Tot. 100.50	Fin. $68.00 Ins. 26.50 Tot. 94.50	Fin. $73.00 Ins. 28.25 Tot. 101.25	Fin. $67.00 Ins. 26.50 Tot. 93.50	Fin. $69.00 Ins. 26.50 Tot. 95.50	
	Cash to be raised	Tot. $864 Fr. VW 700 Diff. 164	Tot. $965 Fr. VW 700 Diff. 265	Tot. $853 Fr. VW 700 Diff. 153	Tot. $913 Fr. VW 700 Diff. 213	Tot. $788 Fr. VW 700 Diff. 88	Tot. $817 Fr. VW 700 Diff. 117	

FIGURE 38 (continued)

		Atomic		Bravo		Cutthroat		Dagger		Elf		Flame	
Value	**Wt.**	**Rate**	**Prod.**	**Rate**	**Prod.**	**Rate**	**Prod.**	**Rate**	**Prod.**	**Rate**	**Prod.**	**Rate**	**Prod.**
Price	3	3	9	1	3	3	9	2	6	4	12	3	9
Accel.	2	3	6	2	4	3	6	3	6	1	2	1	2
Mileage	8	1	8	3	24	2	16	1	8	4	32	3	24
Braking	5	2	10	1	5	3	15	4	20	3	15	1	5
S. Comf't	3	3	9	1	3	3	9	4	12	1	3	2	6
R. Comf't	3	2	6	1	3	2	6	3	9	1	3	2	6
Noise	3	2	6	2	6	2	6	3	9	1	3	2	6
Handling	2	1	2	2	4	1	2	2	4	1	2	2	4
Repair	7	1	7	4	28	2	14	2	14	4	28	4	28
Appear.	4	1	4	2	8	1	4	4	16	4	16	3	12
		SUM	67		88		87		104		116		102
Sum of values weighted 4 or higher			29		65		49		58		91		69

Rank Order

All values	Values wt. > 4
1. Elf	1. Elf
2. Dagger	2. Flame
3. Flame	3. Bravo
4. Bravo	4. Dagger
5. Cutthroat	5. Cutthroat
6. Atomic	6. Atomic

FIGURE 39

Desirability sums for a decision about buying an automobile. The decision-maker computed the sums based on all ten values (upper) and recomputed them using only the four values weighted 4 or higher (middle). The rank of the Dagger is much lower when only the top-weighted values are considered (bottom).

Option	Sum	Chances in 100 of delivery
Atomic	67	75
Bravo	88	100
Cutthroat	87	75
Dagger	104	70
Elf	116	60
Flame	102	100

FIGURE 40

Desirability sums and chances of success for a decision about buying an automobile. The figures are simply transferred to the chart after being computed elsewhere. If the decision involves serious losses as a consequence of failure, it may be better to estimate them instead of the chances of success.

APPENDIX A

WEIGHTINGS, RATINGS, AND SPECIFICATIONS

Students are sometimes confused about the distinction between the weight they assign to a value to signify its importance to them, the rating of an occupation on that value, and the specification they impose on the value in order to retrieve occupations in LOCATE. Weights and specifications are numerical expressions of qualites in students--their hopes and expectations. A rating indicates the extent to which an occupation provides opportunity to satisfy the rated value, and it is independent of the students.

Thus weights and specifications occupy a separate domain from ratings. Students might desire and specify qualities that do not exist, such as perpetual vacations at high salaries. Conversely, occupations might provide wide opportunities for "satisfactions" that nobody wants, such as blood, sweat, and tears.

An analogy may help distinguish these three qualities. Suppose you want a lot of viatmin C in your diet. You show this decision by WEIGHTING vitamin C at the top of the scale, 8.

Now, foods vary in the amount of natural vitamin C they contain. Therefore, they can be RATED or graded with respect to their vitamin C content. If we use the scale employed by SIGI for its ratings, we might rate oranges 4 (top of the scale) and refined sugar 1 (bottom of the scale) on vitamin C. Notice that these RATINGS have nothing to do with your value

WEIGHTS; they depend on the chemical composition of the foods, not on what you want.

When you shop for groceries, you probably seek foods that are high in vitamin C because it is important to you. You therefore SPECIFY that you will accept only foods that possess some minimum level of the vitamin. For example, you might SPECIFY "A more than average amount" and say that a more than average amount means a rating of 3 or 4. Now when you roll your cart down the supermarket aisles, you have a basis for testing foods to see whether or not they are acceptable to you with regard to vitamin C. Oranges, lemons, grapefruit, kumquats go in your cart; sugar and candies stay on the shelves.

APPENDIX B

EMPTY LISTS IN LOCATE

If a set of values/specifications does not retrieve any occupations in LOCATE, the students are forced to lower their specifications, one step at a time, until finally occupations are retrieved. For example, suppose a student's values and specifications are as follows:

	Specifications	
Values	Numerical	Descriptive
Independence	4	A great amount
Helping Others	3	A more than average amount
Variety	2	An average amount
Security	3	A more than average amount
Prestige	2	An average amount

Let us suppose that these values/specifications result in an empty list. We will suppose further that the student then reduces the specification for Security from 3 to 2 and retrieves a list.

It is a valid inference that all the occupations have a rating of 2 on Security. Occupations rated 1 are held back by the specification, and occupations with a rating of 3 or 4 would have appeared with the previous specification.

It is NOT valid, however, to infer that Security was the only value that resulted in the empty list. The student might have reduced the specification of Independence to 3 and retrieved a list of occupations. It would, of course, be a different list from the one retrieved when Security was reduced, for all the occupations on it would have a rating of 3 or 4 on Security.

Consider these five sets of occupations and their ratings on the five values:

Values	Original Specification	Ratings Set A	Set B	Set C	Set D	Set E
Independence	4	3	4	4	4	4
Helping Others	3	3	2	3	3	3
Variety	2	2	2	1	2	2
Security	3	3	3	3	2	3
Prestige	2	2	2	2	2	1

No occupation would be retrieved with the student's original specifications. But if the specification for Independence is reduced one step, set A, and no other set, will appear. Reducing Helping Others instead of Independence would generate set B, but still exclude sets A, C, D, and E. And so on with the specifications for the other three values: reducing Variety generates set C; Security, set D; and Prestige, set E. The sets are all mutually exclusive; no occupation in set A is also a member of set B, C, D, or E.

Reducing two specifications would, of course, cause two different sets to appear. That is, reducing Independence and Helping Others simultaneously would generate a list consisting of both sets A and B.

The fact that a list consists of the union of two or more sets has implications for a person trying to judge the values dimensions of a list of retrieved occupations. For example, suppose we reduce our specification for Independence from 4 to 3 and also our specification for Variety from 2 to 1. We will generate a list consisting of sets A and C. It is NOT a valid inference that all occupations on our list are rated at the bottom of the scale on Variety. Some of them (those in set A) are rated higher.

Only two inferences are valid with respect to the ratings of occupations on a list:

1. All the occupations meet or exceed the minimum specified for each value.

2. If no occupations were retrieved and then a specification was lowered, generating a list, all occupations on the list are rated at the level of specification for the value that was reduced. They may be rated higher than the specifications for the other values.

Counselors should be cautious in making inferences that are too broad about the occupations retrieved in LOCATE. The main purpose of the system is to nominate occupations for further exploration in COMPARE and STRATEGY. Although LOCATE does yield information about occupations, it is not the best system to use for that purpose.